

**The identification of barriers and enablers impacting the adoption
and maintenance of the Thai government's organic standard: the
case of Thai organic rice producers**

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Abstract

This doctoral research examined the causal factors contributing to organic farming *practices* and *certification* in Thailand. Organic farming practices involve farmers using methods of crop production that rely on specific techniques. These include: crop rotation, the use of natural fertilisers and pesticides, as well as the prohibition of synthetic petrochemicals, hormones, antibiotics, and genetically modified organisms - GMOs (Kilcher, 2007; Kristiansen, Taji, & Reganold, 2006; Sandhu, Wratten, & Cullen, 2010). In response to consumer demands, more farmlands in Thailand are being converted to organic production (Midmore et al., 2001). In 2003, *Organic Thailand* certification (a Thai government standard) was introduced by the National Bureau of Agricultural Commodity and Food Standards, and the Ministry of Agriculture and Cooperatives after excessive use of agrochemical agriculture, such as pesticides and synthetic fertilisers (Pornpratansombat, Bauer, & Boland, 2011). With the introduction of organic certification, more organic farmers have started implementing organic practices according to the standard (Kramol, Villano, Kristiansen, & Fleming, 2015).

While earlier studies dealt with consumers' perceptions and trust in organic products (Abrams, Meyers, & Irani, 2010; Ara, 2003; Kihlberg & Risvik, 2007; Law, 2015; Roitner-Schobesberger, Darnhofer, Somsook, & Vogl, 2008), research with an explicit focus on farmers' points of view towards organic certification has yet to be scrutinised. Several studies have analysed the enablers and barriers faced by farmers when seeking and implementing organic certification in some countries: the UK (Barrett, Browne, Harris, & Cadoret, 2002), Austria (Darnhofer,

Schneeberger, & Freyer, 2005), and the United States (Guthman, 2014). A small amount of research has considered organic certification in developing countries: Nepal (Bhat, 2009), Costa Rica (Blackman & Naranjo, 2012), and Africa (Bolwig, Gibbon, & Jones, 2009). To date, there appears to be no study that has explored and uncovered the support structures in place (enablers) or the obstacles faced (barriers) when farmers pursue and try to maintain their *Organic Thailand* certification. What is more, little is known about how Thai farmers take advantage of the enablers and deal with the barriers when seeking to implement good organic farming practices and processes. This research addresses these gaps.

This thesis presents the research processes the researcher went through. First, a thorough analysis of (a) organic farming practices outside Thailand, (b) organic farming practices inside Thailand, and (c) the *Organic Thailand certification* processes carried out. The objective was to develop a comprehensive list of the enablers and barriers organic Thai farmers might face when seeking and maintaining the organic certification, *Organic Thailand*, which could then be tested and scrutinised by organic Thai farmers. The most common crop farmed in Thailand is rice (Devendra & Thomas, 2002) so the participants recruited for this research were certified organic rice farmers based in Thailand.

The research adopted a qualitative approach, semi-structured interviews with certified organic rice farmers, document reviews and analysis, and observations. A content analysis approach was employed. The research presents a model of Thai Organic Rice Farming (TORF) which explains four key ‘actors’ (farmers, standards, resources and skills, and management system/documentation), and four key ‘processes’ (learning about the standard, assessing the availability of resources and

skills developing practical knowledge about managing and documenting, and operational competencies) in the successful implementation of organic rice farming *practices* and *certification*. The limitations and contributions of the thesis/research are discussed.

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Chapter One

Introduction

1.0 Overview

According to *Organic Thailand* certification, farmers are responsible for all farm inputs used, production processes, and certification processes and standards (Kramol et al., 2015). This research explores the insights of certified organic farmers when achieving and maintaining organic farming certification. Farmers mainly produce organic rice crops along with varieties of vegetable and fruit crops such as cabbage, tomato, banana, and papaya and are based in the northern region of Thailand.

This chapter provides an overview context of the research background which explains the organic certification process and organic farming practices in Thailand. This chapter also states research aims, objectives, and research questions to identify the most important aspects of this research. This chapter further explains the thesis structure and finally concludes with a summary.

1.1 Research Background

The production and consumption of organic produce in developed economies has been increasing along with the increase of certified organic products (Schiebel & Haas, 2009). From a consumer perspective, an organic lifestyle serves not just the physiological need for healthy living, but also the practical need to preserve the natural environment (Hjelmar, 2011). In Thailand, more than five million small farms depend on agriculture, which includes food production, livestock production,

forestry, fisheries, and aquaculture (Luedi, 2017). Sixty percent of the country's population are engaged in agriculture (Pinthukas, 2015). Significant economic developments and sustainable practices take place in the agriculture sector in Thailand (Wynen, 2011). The average cultivated area is approximately fewer than eight hectares (Kobayashi, Thaiyotin, Ishida, & Inoue, 2016). Moreover, rice is the basic staple food of the country that is commonly grown on half of all cultivated areas in Thailand (Poapongsakorn & Chokesomritpol, 2017).

The concerns surrounding organic farming have become a crucial issue which, in turn, has led to the development of sustainable agriculture in Thailand (Nontasiri, Dash, & Roberts, 2018). Organic farming relies on farming techniques such as the usage of natural fertilisers and crop rotation. The application of synthetic petrochemicals, hormones, and antibiotics, in the raising of livestock and genetically modified organisms, is strictly limited in organic farming practices (European Commission). For farmers, there are several advantages and disadvantages of organic farming, the restrictions on the minimised use of synthetics being one example of a disadvantage (Ponisio et al., 2015). Another disadvantage is that higher organic treatment intensities reduce crop productivity (Muneret, Thiéry, Joubard, & Rusch, 2018). Further downsides are seen in premium pricing on eco-labelled products, and this reflects the additional costs associated with various organic products ranging between 15-60 percent higher than conventional products in the UK and Danish markets (Ankamah-Yeboah, Nielsen, & Nielsen, 2016). However, some organic products enjoy the organic price premium such as poultry, coffee, and rice (Delmas & Grant, 2014). Organic products are identified through labelling, and consumers are willing to pay higher prices because they

perceive the positive connotation of organic products being associated with higher quality (Asche, Larsen, Smith, Sogn-Grundvåg, & Young, 2015).

Internationally, organic farming has been growing steadily. Worldwide, consumer expenditure on organic products has increased to a staggering USD\$62.9 billion in 2012 from USD\$15.2 billion (Statista, 2013). In response to consumer demand, more farmlands are being converted to organic production. For example, Delmas and Grant (2014) report a negative impact on prices associated with organic wine certification which increased the cost of certified wine by 13 percent, but reduced the selling price by 20 percent - forcing the eco-labelled wine producers to sell at a price discount (Delmas & Grant, 2014; Delmas & Lessem, 2014).

Thai organic farming has been implemented since the 1890s. Certified and non-certified organic farmers and non-government organisations or NGOs established a farmer's group called the Alternative Agriculture Network or AAN in 1989, to share organic farming knowledge and experiences. In 2003, the *Organic Thailand* certification was introduced in Thailand by the National Bureau of Agricultural Commodity and Food Standards, and the Ministry of Agriculture and Cooperatives after excessive use of agrochemical agriculture, such as pesticides and synthetic fertilisers (Pornpratansombat et al., 2011). Organic certification is a guideline of production processes and production techniques for farmers who want to implement organic farming practices. With the introduction of organic certification, more organic farmers have started implementing organic practices according to the guidance of the *Organic Thailand* certification and have been able to obtain certification (Kramol et al., 2015). Thai farmers integrate organic farming systems by producing varieties of plants such as potatoes, cabbages, rice, bananas, and

lemongrass on one farm without using pesticides or synthetic fertilisers. Organic farming is an alternative farming system that drives environmentally friendly production and improves the quality of life for many people.

In Asia, 43.1 million hectares of land are used for organic food production by two million producers in Asia (Research Institute of Organic Agriculture, 2012). Thailand stands as one of the key exporters of many conventional agricultural products worldwide but contributes only three percent of organic production in Asia (Willer, 2011). Land used to produce organic farms in Thailand increased by 39.9 percent per year annually from 1998 to 2013 (Jitsuchon & Methakunavut, 2015). Most certified organic farms were mainly used for organic rice farming, which accounted for 49,710.03 acres. Kongsom and Panyakul (2016) indicated that the amount of land used for creating organic farms remained limited, at 9,218 to 83,309.2 acres. There was an increasing number of farmers who applied for the certification and received it from 2001 to 2013 (Murthy, Mazumdar, Rani, Tabassum, & Chandra, 2014).

Several studies have analysed the enablers and barriers to the implementation of organic certification in many countries (Barrett et al., 2002; Bravo-Monroy, Potts, & Tzanopoulos, 2016; De Ponti, Rijk, & Van Ittersum, 2012; Kelly & Bateman, 2010). Few studies have addressed enablers and/or barriers to implementation of organic certification in developing countries where they may be different from those in other organic practices (Blackman & Naranjo, 2012; Bravo-Monroy et al., 2016). The organic farming production area was strictly limited to 0.29 percent of all national agricultural land in 2016 (Jitsuchon & Methakunavut, 2015). Despite a few success stories of organic farming in Thailand, and the support of the Thai

government, organic farming still strives to create a greater presence there. Thus, the research aims to understand the factors that enable and prevent organic farming implementation. The primary beneficiaries of this research include organic farmers, government institutions, public institutions, and stakeholders who participate in organic certification.

1.2 Research Aim and Objectives

This research aims to identify the uncovered enablers and barriers to achieving and maintaining the *Organic Thailand* certification, and the interactions among those enablers and barriers. The first research objective is to explore the literature and information surrounding organic farming practices. The second research objective aims to identify factors enabling and preventing organic certification for organic rice farmers in Thailand. The last research objective focuses on an analysis of how barriers and enablers interact with each other to achieve and maintain organic certification.

1.3 Research Questions

As previously mentioned, this research focuses on the certification of organic farming in Thailand. The below questions have been developed to work towards the purpose of providing insights into organic farming certification.

1. What are the enablers that farmers encounter when achieving and maintaining organic certification?
2. What are the barriers that farmers encounter when achieving and maintaining organic certification?
3. How do the barriers and enablers interact with each other in regard to achieving and/or maintaining organic certification?

1.4 Significance of the Research

Previous studies have already dealt with consumer perception and trust in organic food (Kutnohorska & Tomšík, 2013; Seegebarth, Behrens, Klarmann, Hennigs, & Scribner, 2016), however, studies with an explicit focus on farmers' points of view towards organic certification are still being scrutinised (Bravo-Monroy et al., 2016; Hattam, Lacombe, & Holloway, 2012). This research offers an overall contribution to the empirical literature on organic certification. As there is a lack of empirical literature aimed at gaining a cohesive understanding of factors enabling and preventing organic certification, this research provides a preliminary concept of how challenging factors can be overcome to assist organic farming production, certification standards, and adopters of organic certification.

The outcome of this research contributes to the development of a conceptual organic farming practices framework for all actors who participate in organic certification, including farmers, certifiers, and external organisations such as government agencies, local universities, and organic networks. Consequently, this conceptual framework addresses the knowledge gap of organic certification in developing countries and provides guidance that helps all organic certification participants to achieve and maintain organic certification, and improve their organic farming performance.

1.5 Structure of Thesis

This research consists of six successive chapters. The remaining five chapters are organised as follows:

Chapter two is divided into three parts. The first part provides a review of the empirical studies in academic literature associated with organic farming practices

and organic certification. The empirical studies provided an understanding of key enablers and barriers surrounding organic farming practices and organic certification, and were taken from previous academic literature in both developed and developing countries. The second part discusses the overview of organic practices in Thailand as a context for the current research. This part also points out the movement of Thai organic practices and provides a brief detail of the main organic crops. The third part provides details of organic certification followed by the detailed steps in the organic certification process and the requirements for the production and process of organic goods.

Chapter three outlines the choice of the qualitative research methodology adopted in this research after discussing the rationale of a qualitative research method. In addition, the purpose of this chapter is to also identify the research design and description of the sample selection. This is followed by a discussion on data analysis and the integration procedure of this research.

Chapter four details the results of data analysis to answer the research questions that are mentioned above in the research questions section. The data analysis is presented in six topics based on findings relating to: (1) farm conversion from conventional to organic; (2) the prevention of chemical contamination from neighbouring farms; (3) soil preparation and management of organic farms; (4) pest, weed and disease prevention and management on organic farms; (5) organic seed sourcing and reproduction on organic farms; and (6) organic rice harvesting and post-harvesting practices.

Chapter five provides a comprehensive discussion of findings by explaining in

detail how enablers and barriers link to one another. The organic farming practices framework is developed and discussed with other relevant empirical studies and academic literature. This is followed by the explanation of key actors and processes that lead to the desired outcomes, which are organic farming practices. The practical implications are discussed in relation to participants who have responsibilities in *Organic Thailand* certification. This chapter also notes the limitations, and finally, provides details of recommendations for future research.

Chapter six offers conclusions summarising the research findings, analysis, and contribution.

Chapter Two

Literature Review

2.1 Factors for the implementation of organic farming practices

When considering the topic of farming in general, there are at least ten types of farming practices across the world. The types of farming practices are (1) *Extensive farming* where farmers use small amounts of labour, fertilisers, and capital, relative to the production system; (2) *Intensive farming*, which contrasts extensive farming due to more farms used in the same plot of land to get a higher yield; (3) *Specialized farming*, referring to farms where 50 percent or more of the farm's revenue is derived from a single crop, livestock, dairy, or poultry, etc.; (4) *Mixed Farming*, where farmers combine crop production with the rearing of the livestock; (5) *Diversified farming*, which focuses on maintaining several enterprises at once such as crops, livestock, dairy, poultry, etc., but no single enterprise produces more than 49% of the farm's income; (6) *Dry Farming*, which refers to farms located in drylands areas, having an average annual rainfall of less than 0.5 centimetres; (7) *Cooperative Farming*, which refers to joint agricultural operation by local farmers on a voluntary basis such as machinery, stock in certain areas of activity; (8) *State farming*, which refers to farms where the government provides finances as well as other facilities and also assists in policy being adopted; (9) *Collective farming*, where farmers are members who elect a managing committee that is responsible for the allocation of work, distribution of income and marketing of surpluses; and finally (10) *Peasant farming*, in which family members work together to grow crops and often rear some livestock on a small scale.

Most organic farms in developing countries such as the Philippines, and more recently Vietnam, use small-scale farming as an alternative to organic crop production, and this style of farming has also been practised in Thailand. Thailand typically operates with small organic farms with size of less than 50 acres (Reganold & Wachter, 2016). This study discusses extensive and intensive arable farming in regard to both organic and conventional farms, due to these being the primary types of farming in Thailand. Organic farming aims to promote natural techniques and relies heavily on natural resources (Guthman, 2014). Most basic operations of organic farming include rotating crops, using organic fertiliser such as green manure, and maintaining the diversity of crops. Organic farming aims to improve the quality of life and eliminate synthesised chemical usage (Padilla Bravo, Spiller, & Villalobos, 2012). The purpose of the literature review in this research is to identify the factors surrounding organic farming implementation, including the enablers and barriers of organic farming practices among organic farmers.

Many literature reviews identified factors accompanying organic farming practices as such: personal factors, environmental factors, social factors, and economic factors (Bravo-Monroy et al., 2016; Silva, Dong, Mitchell, & Hendrickson, 2015; Zhao et al., 2018).

2.1.1 Personal factors

Demographic information captures personal factors that serve as a basic understanding of how farmers relate to the implementation of organic farming (Dinis, Ortolani, Bocci, & Brites, 2015). Demographic information in this study consists of the race, age, gender, and education of certified farmers who implement organic farming practices. Beltrán-Esteve, Picazo-Tadeo, and Reig-Martínez (2012) found that in Spain, organic farmers were younger than conventional farmers.

Furthermore, in Portugal and Italy, gender has also been shown to be a significant factor, as there was a higher proportion of female organic farmers among agricultural farmers (Dinis et al., 2015).

Education is another significant factor (Midmore et al., 2001; Sodjinou, Glin, Nicolay, Tovignan, & Hinvi, 2015). Previous studies found that higher levels of education enhanced positive attitudes towards organic farming practices (Shams & Fard, 2017; Silva et al., 2015), and improved the performance of farming techniques (Krause & Spicka, 2017). However, despite the fact that education has more involvement in organic farming, higher levels of education were insignificant in determining the implementation rate of organic farming (Qiao, Martin, Cook, et al., 2018).

Tscharntke et al. (2012) identified that small scale farming was considered enormously important for food security in developing countries. Farm size influenced decision-making processes to gain certification towards organic production (Jouzi et al., 2017). Farmers who manage larger farms are more likely to change their farm management techniques by utilising a mixture of organic and conventional farming (Lin, Huber, Gerl, & Hülsbergen, 2017). Zen and Brandão (2018) mentioned that organic farmers may gain benefits when diversifying their sales across marketing channels, as this will expand the number of potential buyers. This contrasts with small contract farms, which were more likely to use fewer marketing channels. A popular channel which has been implemented is a farmers' market, where organic food is sold directly to end consumers (Thorsøe & Noe, 2016). Small scale farmers used this channel to make profits via their distributors using the price premium (Jouzi et al., 2017).

Another factor that influences farmers in implementing organic farming is their intentions. Farmers usually possess broad objectives prior to starting farming activities (Hall, Dennis, Lopez, & Marshall, 2009), and the intention of farmers tends to play quite a big role in whether they adopt organic or conventional practices (Sharifuddin, Mohammed, & Terano, 2016).

The answer to their intention lies in farmers' perceptions of farm income, farm households, and their desires to improve their quality of life (Karipidis & Tselempis, 2014). If the intention of farmers is directed towards profitability, then conventional farming is generally preferred, but if the intention is to produce a quality farm with natural end-products, then organic farming is preferred (Ullah et al., 2015).

However, the intentions of farmers can be altered when cultivation areas increase (Karipidis & Tselempis, 2014). Farmers make decisions about environmental management by integrating it with other factors such as economic and psychological ones (Bravo-Monroy et al., 2016). Organic farmers' values regarding conservation and sustaining their land are typically the same as previous generations of the family. In contrast, conventional farmers value farming as family succession, resulting in higher profitability and production (Sharifuddin et al., 2016).

2.1.2 Environmental factor

The Environmental factor is another important factor that contributes to how organic farming practices can be implemented. The concern about insufficient natural resources is becoming more vital than ever (Basha, Mason, Shamsudin, Hussain, & Salem, 2015). Organic food production has triggered many producers to direct more attention to organic crop production, which contributes a higher

environmental contribution to society (Olson, 2017). Organic farmers are generally always looking for ways to preserve soil quality and natural resources (Reganold & Wachter, 2016). Organic farmers amend depleted soil with lipids, carbohydrates, proteins, and nucleic acids, or other organic compounds that occur naturally in plants and animals. Changes in biological activities and biodiversity greatly affect organic soil quality (Bowles, Hollander, Steenwerth, & Jackson, 2015).

Organic farming practices increase soil nutrient content, which in turn helps to decontaminate the land of chemicals and pesticides. Several authors documented that higher soil quality in organic farming was associated with higher microbiological activity due to crop rotation and the use of organic fertilisers (Bowles et al., 2015; Sandhu et al., 2010).

Organic farms improve soil quality in a number of ways (Bonanomi et al., 2016; Reeve et al., 2016). An example of this is the increase in the amount of permanent organic soil matter, such as higher levels of nutrients, higher mineral contents, and higher levels of carbon and energy (Lehmann & Kleber, 2015). Most conventional farmers tend to use synthetic fertilisers to bolster their soils, as these types of fertilisers possess chemical properties that provide necessary nutrition for plant roots within a short period of time. An average chemical property release time is generally two to four days. Organic farmers rotate their main crops with soybean to ensure that the main crops do not deplete the nutrients in the soil, helping to prevent soil erosion (Cox, Hanchar, & Cherney, 2018). They commonly place an emphasis on crop rotation and organic matter content in order to conserve soil life and the soil life cycle (Shrestha, Singh, Forte, & Certini, 2015). For instance, Zhao et al. (2018)

mentioned that organic nutrient sources such as authorised fertilisers and compost extracts increase soil fertiliser inputs and enhance biomass in Chinese croplands.

Previous studies comparing different aspects of nutrient content in regard to organic and conventional farming methods are quite limited, and most of the studies were found to be inadequate in research design and methodology (Hoefkens et al., 2010; Kleemann, 2011). The nutritional quality evaluations in organic products have mostly consisted of an analysis of macronutrients, vitamins, and mineral content (Kapoulas, Ilic, Milenkovic, & Mirecki, 2013).

Organically grown products are perceived as being a better quality as well as having a higher vitamin C content, approximately 11 percent higher, when compared to conventionally grown ones (Phillips et al., 2018). Cardoso, Tomazini, Stringheta, Ribeiro, and Pinheiro-Sant'Ana (2011) found higher vitamin C concentrations in organically grown acerola in Brazil compared to its conventionally grown counterparts. Hoefkens et al. (2010) also stated that intensive concentration of Vitamin C existed in organically grown tomatoes, but a significantly lower content was found in organically grown carrots and potatoes. Organic tomatoes were found to have a significantly higher content of Calcium, Copper, Zinc, and Rubidium, and alongside this, a higher content of Copper and Rubidium was found in organic lettuce (Kelly & Bateman, 2010). In addition, Skrabule, Muceniece, and Kirhnere (2013) found a higher concentration of vitamin C, B1 and B2 in organically grown potatoes, which shows that the nutrient content of vegetables and fruits differs due to growing conditions, cultivation methods, and handling processes (Phillips et al., 2018).

Another consideration for organic farming implementation is related to energy use. Energy use is the net energy that organic farming and conventional farming use for farm production (Gaudino, Goia, Borreani, Tabacco, & Sacco, 2014). The energy inputs, such as tillage intensity, synthetic fertilisers, and pesticides are used in conventional farming systems (Lin et al., 2017). Organic farmers tend to develop self-sufficient fertilisation methods by using self-produced compost and fertilisers from auxiliary plants and legumes (Zaitsev & Kobayashi, 2012). Conceptually, organic farming aims to remove chemical input use and remove all purchased chemical inputs (Ponisio et al., 2015). Fertilisers in conventional farms rely mainly on fossil fuel energy, which contrasts heavily with the fact that organic farming relies less on fuels and also has a renewable energy usage which is three times that of conventional farming to ensure a sustainable farming system (Astier et al., 2014).

Another environmental indicator related to organic farming is the contribution to biodiversity. Biodiversity can improve crop production through the existence of organic pesticides or fertilisers, and a mix of crop and livestock production within an ecological system (Bonanomi et al., 2016; Puig-Montserrat et al., 2017). There is significance in the relationship between biodiversity and organic farming, as biodiversity contributes to the rotation of soil in every crop season without the need to insert pesticides or chemical substances to boost soil quality (Garibaldi et al., 2017).

Puig-Montserrat et al. (2017) found two more butterfly species, one more bird species, and seven more vascular plants in organic rice paddy farms when they were compared to conventional farms. Furthermore, plants tended to show more flowering due to an increase in the number of pollinators such as bees, further

expanding the biodiversity on organic farms (Kehinde, von Wehrden, Samways, Klein, & Brittain, 2018). Thus, organic farms contain richer and more diverse plant and animal species (Liu et al., 2016).

2.1.3 Social factors

Social factors are another important key indicator of how organic farming is being implemented. Being a part of community networks assists in the contribution of and access to a vast amount of information regarding labour, market preferences and value propositions related to organic farming knowledge, availability of small loans, and availability of credits (Patidar & Patidar, 2015a). Governments, research and development institutions, and distributors of products towards the final consumer are all involved in organic farming networks.

Organic farming is focussed on carrying out local production of food and fibres, developing local facilities, creating cultural identities that lead to conservation of rural landscapes and traditions, environmental education, and health and wellbeing, especially in regard to food (Snider, Kraus, Sibelet, Bosselmann, & Faure, 2016). In Bulgaria, organic production creates potential value to rural development by improving the people's overall quality of life (Velikova & Arabska, 2015). It is common that organic farmers' spouses, parents, and children work together on farms when they decide to produce organic crops (Bravo-Monroy et al., 2016).

2.1.4 Economic factors

Another consideration when implementing organic farming is the economic factors. Differences in the volume of yield between organic farming and conventional farming exist. For organic farms, the total volume of organic yield is generally 19 percent lower than that of a conventional yield (Ponisio et al., 2015). In particular,

the study by Krause and Machek (2018) showed that in the Czech Republic, organic cereal yield per hectare reached around 41 percent relative to the conventional cereal yield. Seufert, Ramankutty, and Foley (2012) examined the causes of yield differences, including soil fertility management, weed control, and irrigation condition.

The organic certification transition period requires three years of established organic production before organic crops can be labelled as organic (Bravo, Ramírez, Neuendorff, & Spiller, 2013). During this transition period, organic farmers are unable to obtain benefits from the organic price premium associated with organic produce (Ankamah-Yeboah et al., 2016). During the transition to organic farming, transition cost, time, and effort are required (Reganold & Wachter, 2016). The most substantial transition costs are associated with investment in buffer zone building, organic amendments, paying property taxes, and managing machine inventories (Zentner et al., 2011).

From an economic point of view, Blanc, Accastello, Girgenti, Brun, and Mosso (2018) identified multiple differences in organic and conventional farming. Operational costs, such as wages, rent, and machinery in organic farms are lower per-acre in respect to conventional farms (McBride, Greene, Foreman, & Ali, 2015). When compared to conventional farms, organic production costs are associated with higher employee working hours, the purchase of substitutes for synthetic chemical inputs, and the higher cost of organic seeds (Sgroi, Foderà, Di Trapani, Tudisca, & Testa, 2015). Initially, some organic farmers choose to use specialised equipment and machinery such as greenhouses, irrigation equipment, rotovators, and tillage and planting equipment (Clark, Khoshnevisan, & Sefeedpari, 2016).

Higher production cost was one of the reasons why organic production was not as attractive. The greater profitability of organic lemon farms in respect to conventional farms in Italy was due to substituting chemical inputs with organic farm inputs (Sgroi, Candela, et al., 2015). Organic farming depends primarily upon a large amount of labour. In particular, the labour costs for Italian lemon farms reached around 40 percent of total production costs (Sgroi, Candela, et al., 2015). Likewise, organic farming typically has higher costs than conventional farming in response to greater proficiency in production activities (Beuchelt & Zeller, 2011). Organic farming practices such as management of mechanical tillage, planting, covering, harvesting, and crop handling greatly affect wages and the cost of hiring labourers (Guthman, 2014).

Organic commodities have higher prices compared to conventionally produced ones (Abraben, Grogan, & Gao, 2017). Several studies stated that organic consumers or buyers compare high prices and quality specifics prior to organic consumption (Bezawada & Pauwels, 2013; Gleim, Smith, Andrews, & Cronin, 2013). In Poland, higher prices of organic products, product quality, product taste, and quality assurance are the main barrier of purchasing organic products (Bryła, 2018). The premium price of organic olive oil, that is guaranteed by organic certification, is a factor contributing to higher profitability in Greek organic olive farms (Berg, Maneas, & Salguero Engström, 2018). However, organic farming gains a greater benefit in terms of cost from a consumer's point of view (Basha et al., 2015).

Distributing organic products is another barrier to the implementation of organic certification. To have their products be certified as 'organic' all organic handlers, including distributors, marketing companies, packers and shippers, and warehouses

and brokers need to prevent organically grown products from coming into contact with prohibited substances or being combined with conventionally grown products (Hamzaoui-Essoussi, Sirieix, & Zahaf, 2013). Moreover, organic farmers have a clear knowledge of market development, alongside another barrier, which is the small number of distributors (Atănăsoaie, 2011). Gajdić, Petljak, and Mesić (2018) suggested that small organic farmers should maintain relationships with specialised organic stores, supermarkets, organic restaurants, and consumers.

2.2 Thai organic farming practices

This section presents an overview of Thai organic farming practices as a context for the current research. Organic farming and consumption continue to increase in both developed and developing countries globally. In 2013, the total global area for organic cultivation land was approximately 43.1 million hectares (Willer, Yussefi, & Sorensen, 2010). More than 17.3 million hectares of organic farming was located in Oceanian countries including Australia and New Zealand, followed by Europe, Latin America, and Asia in 2013 (Willer & Lernoud, 2015).

Over the past decade, the number of organic farmers has increased slightly. The number of organic producers was almost two million around the world (Willer et al., 2010). Asia, Africa, and Latin America were found to be the main regions with the most organic farmers (Lernoud & Willer, 2016). India was one of the countries that had the highest number of organic farmers in the world, followed by Uganda and Mexico. In 2017, Thailand, the Philippines, China, Peru and Paraguay significantly represented the growth in the total number of global organic farmers in 2014 (Willer & Lernoud, 2015).

Organic farming was established throughout Asia with primary support from governments and the rise in consumer interest in food safety. The association of organic farming practices and organic projects was extended globally in Asia. The Greater Mekong Sub-Region Core Agricultural was established in strong support of the organic farming program in the Lao People's Democratic Republic, Myanmar, Cambodia, and Vietnam (Willer & Lernoud, 2015).

In Thailand, organic farming practices have been developed for Thai farmers to minimise damage to the environment. The average annual growth of Thai organic farming has increased by almost 40 percent since 1998. There are five categories of organic farmers in Thailand, including family farms, large scale company farms, public projects such as the Royal project, grower groups with private companies, and grower groups associated with non-governmental organisations (NGOs) (Ellis, Panyakul, Vildoza, & Kasterine, 2006).

Additionally, organic practices in Thailand are driven by private sectors, organic cooperatives, the government, and NGOs. The private sector is divided into three categories, which include traditional family farms, organic project growers, and corporate farms. This sector manages the price and quality of organic products, assists companies in gaining organic registration, and markets organic products. A group of organic cooperatives, and governmental and non-governmental organisations have been officially cooperating with organisations to support their members with valuable training and facilities.

2.2.1 Thai organic practices movement

There are three phases of the organic practices movement in Thailand (Ellis et al., 2006). The first organic practice movement was an increase in consumer perception

to improve quality of health. Consumers prefer organically grown food, which has zero or at least less contamination from chemicals used on farms such as pesticides and fertilisers. The second organic practice movement was the development of sustainable agriculture in Thailand. Crop production in Thailand faced difficult issues in relation to low prices and productivity. In the early 1980s, Thai farmers, together with Non-Governmental Organisations (NGOs), established the Alternative Agriculture Network (AAN). One of the main purposes of the AAN is the movement of organic practices, including transference of organic farming knowledge and farming technologies, to organic farmers.

Addressing concerns in environmental conservation fundamentally became the third movement of organic practices in Thailand. Environmental conservation concerns were raised by the increase of chemical substances used in traditional agricultural farms such as synthetic pesticides and fertilisers. During this stage, the AAN focused on organic standards and the certification system, particularly for local farmers who farm organic crops and support rural Thai communities and economies. Organic Agriculture Certification Thailand (ACT) was issued as the first national organic certification in Thailand in cooperation with the AAN, non-government organisations, academic networks and consumer organisations in 1995. Following this, the International Federation of Organic Agriculture Movements (IFOAM) accredited ACT's standard.

In some developing countries, government policies regarding transference of organic farming knowledge affected the development of organic farming (Lal, 2006). Apart from ACT, there are several local organic standards in Thailand, including the Northern Organic Standards Organisation, the Organic Crop Institute,

the Organic Aquaculture Farm, and the Product Certification Centre. In 2003, *Organic Thailand* certification was established as a guideline in improving the organic production and processing of produce and other products from plants, alongside aquaculture and livestock, in order to protect consumers and promote exports. Growing government attention towards organic practices in Thailand started in 2005 by their support of thousands of organic rice farms (Setboonsarng, Leung, & Cai, 2006).

Currently, Thai organic farming practices are in their early stages. Lack of organic farming technologies and processing facilities force Thai farmers to produce using traditional farming systems. In 2013, certified organic farms covered 35,530.61 hectares or 0.29 percent of total cultivated farming area, producing 71,847 tons of product per year (Kramol et al., 2015). Certified organic farm owners included 9,281 farms or 0.18 percent of total farm households. 57.8 percent of all certified organic farms were certified by international certifiers. Organic products certified in Thailand had a total value of US\$79.8 million in 2013.

The Thai governor established an implementation plan created by the National Agenda of Organic Agriculture, which has been put in place from 2016 to 2021. The objective of this agenda is to encourage Thailand to become the world centre of organic farming in regard to production, consumption, business, and organic services.

2.2.2 Organic Crops in Thailand

Production of organically grown fruits, cereals, grains, beans, herbs, and spices has been rising in developing countries (Seufert, 2012). The proper management of

organic farming increased agricultural productivity and helped to preserve natural resources in developing countries (Ha, 2014).

Thai organic farming primarily focused on organic crop production. Organic crop production includes various kinds of plants including vegetables, herbs, fruits, and cereals, including rice and wheat. With the appropriate resource conditions to produce rice, Thailand is one of a few suitable countries to grow organic rice at a lower cost compared to other countries. Organic farming in Thailand is generated by farm owners or organic projects and 70 percent of organic owners are certified by organic certifiers in Thailand.

The market opportunity of Thai organic crops has been both domestic and international since the 1990s, which is owed to the rise in health concerns. In the middle of 1990s, domestic market consumption decreased due to economic recession and overflow of funds being invested, but international markets were still growing. However, domestic market consumption started increasing again by the 2000s, with the rise being attributed to supermarkets, discount stores, and farmers' markets.

In 2004, supermarket channels were the largest organic sales channels, accounting for 59.5 percent of the total domestic market. The Green Shop is a specialised shop that sells health food and environmentally friendly products, and is another domestic channel, accounting for 29.5 percent of total domestic channels. 5.9 percent of total domestic channels were farmers' markets, restaurants, cafés, and other food services. In terms of international markets, The European Union is the main market

for exports, followed by Asian and Pacific markets. The most significant organic export product was processed food, followed by rice.

2.3 Thai organic certification

To ensure that organic consumers buy organic products, farmers must comply with organic requirements and processes. Organic farms must also be certified by an accredited organisation, although, it is not necessary for a farm to be organically certified. Certification is an assessment of standards provided by organic organisations ranging from the local to international level (Hattam et al., 2012).

Formed in 1980, the International Federation of Organic Agriculture Movements (IFOAM) was the first international organic agriculture standard (Munteanu, 2015). Following this, in the 1990s, several regions such as Europe, Latin America, and Asia announced organic legislation (Raynolds, 2004).

Other international organic standards include the Japanese Agricultural Standard (JAS), EU-Eco-regulation, ECOCERT, and USDA, which cover standards for activities such as production, labelling, and inspection (Skalidou & Oya, 2018). In 2003, The Thai organic agricultural standard was noted by the Ministry of Agriculture and Cooperatives and was established by the National Bureau of Agricultural Commodity and Food Standards, and the Ministry of Agriculture and Cooperatives, as a government organisation.

The standards state a set of requirements for farmers to improve their organic farming practices and processing of products from plants, aquaculture, and livestock, to protect consumers and promote exports. This research focuses particularly on organic production requirements for rice farming.

2.3.1 Organic Thailand certification processes

To become certified in organic farming, all materials used in processing, packaging, or storing organic products must be free of prohibited substances and separated from those used with non-organic products (Abrams, Meyers, & Irani, 2010). Certification standards guaranteed quality within food supply chains (Hattam et al., 2012)

Different certification systems have related certification procedures, and all certifiers carry out inspections through an accreditation process (Munteanu, 2015). Farmers are required to follow the process of *Organic Thailand* certification provided by the Ministry of Agriculture and Cooperatives. This carried a few difficulties as there was a lack of certainty and clarity among certification bodies and auditors during the inspection process (Padilla Bravo et al., 2012). Furthermore, the certification process is complex and is also associated with internal farming processes. The general *Organic Thailand* certification process is described in figure 2.1 below: There are several processes required for gaining organic certification in Thailand (Santacoloma, 2007). The earliest process is to research the organic standard information to assist farmers in understanding the limitations of organic standards in terms of storage, transport, and sale of organic products. In doing so, farmers contact the certifier and complete the application forms. The next process in certification is an inspection process. The purpose of this process is to inspect the compliance of organic farm facilities and organic farming methods. This can include modifying facilities and sourcing and changing suppliers etc., in order to comply with organic standards. At this stage, farmers should prepare information about their

organic farming history and results of current farm production such as details about the soil, water, seeds, and manure.

Processes to achieving *Organic Thailand* certification

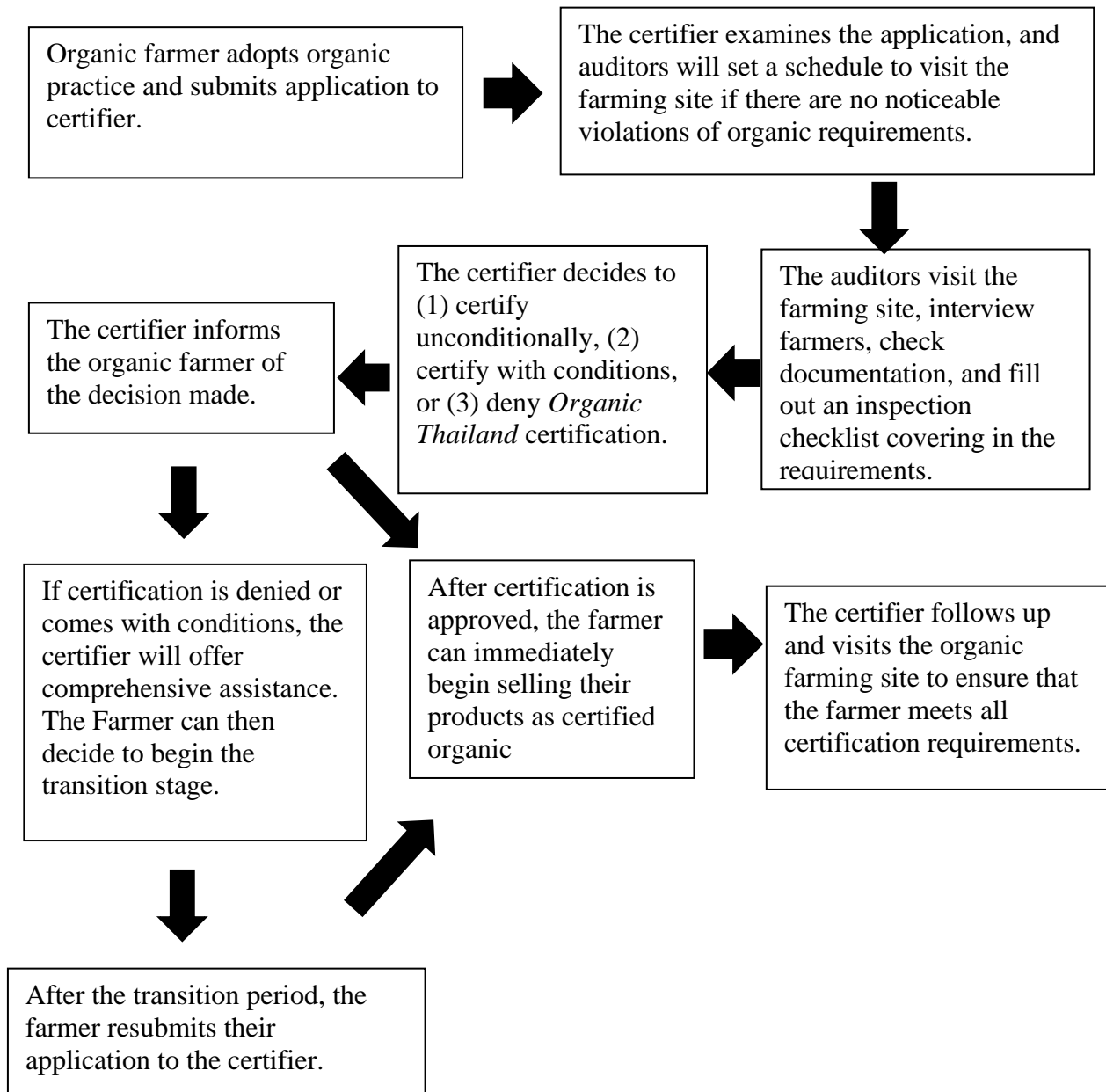


Figure 2.1: Processes to achieving *Organic Thailand* certification.

In addition, certifiers will contact qualified auditors to inspect organic farm sites and conduct comprehensive annual on-farm inspections at the same time. The inspector operates on behalf of the organic certifier, and their responsibility is to collect information on the organic farm site and report to the certifier (Munteanu,

2015). An annual production plan must be submitted at this stage which details the farming process and covers seed sources, crop location, fertilisers used, pest control methods, harvesting processes, and storage locations. After that, certifiers will review the inspection report and make a certification decision in the next process of certification.

Organic farmers will receive the certification result whether certification requirements are met or not. By failing to comply with *Organic Thailand* certification in the first place, organic farmers are required to take corrective actions to meet certification requirements and repeat the inspection process. The last certification process is the use of organic seals or labels. Organic labels can be used on organic products when organic farmers sign an organic certification agreement with a certifier.

There is an annual inspection during the certification period. If they own an organically certified farm, farmers must keep records of day to day farming activities and report this in order to renew their certification every year. Conversely, certifiers are able to inspect certified farms at any time as long as such farms are under the certification period (Janssen & Hamm, 2012). Certified organic products are labelled as organic on their packages. An organic product which contains more than 95 percent organic components can be labelled as an organic product on its package. However, if an organic product contains only 70 percent organic components, it cannot be labelled as an organic product, but the placing of the percentage of organic ingredients on its package is allowed.

2.3.2 Organic Thailand certification standards

Organic certification standards and requirements differ significantly between different countries (Janssen & Hamm, 2012). The content of these standards includes growing, processing, packaging, storage, and shipping within organic farming systems. The Thai organic agricultural standard is an organic certification body of the Ministry of Agriculture and Cooperatives under the *Organic Thailand* label.

To certify their farm as organic, organic farmers must comply with organic farming certification requirements. Organic farmers carry out an organic farming business which ranges from producing organic products to the selling and labelling process. This research focuses on certification of organic rice farming, particularly in Thailand. According to the Organic Thailand certification standard, there are several standards in organic crop production which must be met in order to certify organic farming, including the transition period; diversity of plants; crop rotation; soil and water management; disease, pest, and weed prevention and control; prevention of contamination; and harvest and post-harvest management.

A transition period is the first standard of *Organic Thailand* certification. Conversion length of organic vegetable and cash crop production generally takes one year. Other organic perennial crops that are commercially grown year-round and harvested multiple times before dying ordinarily take three years. During the conversion period, harvested products from farms are not recognised and labelled as organic products. The second requirement is to grow wide varieties of plants that would preserve the local ecology surrounding organic farms. These bio-diversified

plants contribute to the resistance to pests and diseases which can affect organic produce (Vanderplank, 2012).

According to the *Organic Thailand* certification standard, Artificial or natural dispersal of seeds and plants is prohibited. Using conventional seed is permitted when organic seed cannot be produced from organic farming but should not be contaminated with chemical treatment. Plant diversity is another standard to certify organic farming. Rotating crops is a compulsory process in organic farming to establish the diversity of plants, and planting a diverse range of plants protects organic boundaries against diseases, insects, and weeds (Shrestha et al., 2015).

Furthermore, rotating leguminous crops improves soil fertility and increases the amount of organic matter found in soils, and due to this, organic farms have higher plant abundance within cropped farms. Another standard is parallel crop production (Cox et al., 2018). Organic farmers are not permitted to grow crops which are similar to conventional ones within the same field. However, growing varying types, shapes, and colours of crops is permitted as well as harvesting at different times. In terms of soil, water, and fertiliser management standards, organic farmers need to comply with organic standards. Organic yields depend more on soil, water, and fertiliser improvements over that of conventional yields (Seufert et al., 2012). Planting cover crops for organic manure supports soil improvement by protecting organic land surface from the salinisation of soil, thus, improvements in organic soil techniques should be addressed. Farmers operate farming techniques when fertilising soils, and an important technique is attempting to use plant and animal manure as organic fertiliser.

Another technique is to reduce the use of heavy machinery in organic farming for soil improvement. Heavy machinery such as intensive tillage, traction, and power trains completely destroy organic soil structure and its natural compaction (Reeve et al., 2016). Moreover, organic farmers should maintain the proper salinisation of soil through lime, dolomite, marl or sawdust ash cropping (Schmidt et al., 2011).

Additionally, during the *Organic Thailand* certification process, organic farmers are normally concerned about water management. Quality of water and water conservation, as well as water extraction, are water management issues in organic farming. Cambardella, Delate, and Jaynes (2015) identified that organic farms have a higher water quality when compared to conventional farms owing to the use of composted animal manure, green manures, and crop rotation (Wheeler, Zuo, & Loch, 2015). Water conservation is ensuring there is sufficient capacity of water available to facilitate organic farming for future crops (Saiz et al., 2016). Another water management issue is water extraction. Irrigation is a water extraction process that supplies water to plants during inadequate rainfall periods (Oh et al., 2013). Prevention and control of diseases, insects, and weeds are additional standards in the organic farming certification process. Instead of ongoing growth of the same crops in the same field, organic farmers need to balance natural resources in organic fields in order to reduce pest and weed problems. Growing flowers and plants or building nests for birds also helps to limit the damage done by pests. Regarding the growth hormones standard in certifying organic farms, only natural sources of growth hormones are allowed to be used, and this is in order to comply with organic farming standards. Avoiding contamination from chemicals and pollution is another standard that is required in certifying organic farms. Organic farmers are responsible

for preventing chemical contamination, and thus, equipment and machines used in organic farms should be clearly separated from conventional ones. Management of harvesting and post-harvest procedures are the final standards needed to comply with *Organic Thailand* certification requirements. All harvesting, including handling and processing, should be inspected by organic certifiers.

2.4 Chapter summary

It is argued by most organic farmers that organic farming practices are perceived as a form of farming that takes up more resources than conventional farming (Muneret et al., 2018), but provides better returns to farmers (Pinthukas, 2015). Although there is a sufficient amount of literature addressing issues of whether organic farming is suitable for farmers in Thailand (Bravo-Monroy et al., 2016; Karipidis & Tselempis, 2014; Kramol et al., 2015; Saiz et al., 2016), considering the literature review, it seems reasonable to critically review the barriers and enablers towards organic certification. To the researcher's knowledge, no such study exists for Thailand surrounding the *Organic Thailand* certification process. In addition, there is much less organic farmland when compared with conventional farms. For these reasons, the researcher strived to identify barriers and enablers of organic certification and how these can affect farmers' perceptions of adoption of organic certification. This research, therefore, scrutinises identified barriers and enablers to create an enhanced understanding of how farmers can overcome these barriers when implementing *Organic Thailand* certification. It contributes to the knowledge by pointing towards factors that affect farmers on their journeys to adopt organic farming practices. This includes reviewing certification process and crop production requirements, as these represent the major aspects impacting the decisions farmers

make when considering implementation of *Organic Thailand* certification. Such understanding will allow farmers and certification bodies to understand the reality and nature of organic certification, and assist in creating a more effective approach to adopting organic certification.

Chapter Three

Methodology

3.0 Introduction

The previous chapter in this research examined the reviews of academic literature and provided an overview of organic certification, specifically on the concept of barriers and enablers in achieving and maintaining organic certification. This research found that the literature with an explicit focus on farmer insights towards organic certification is yet scrutinised (Bravo-Monroy et al., 2016).

Therefore, due to the exploratory research method needed to provide evidence to fulfill the gap in the literature, a qualitative research method was chosen for a comprehensive understanding of the organic certification process. This chapter offers an underlining description of the research design used to collect data exploring what the enablers and barriers in achieving and maintaining organic certification are. It explains the sampling procedure, the data collection method, and finally the data analysis procedure.

3.1 Research Methodology

This research onion was developed to define the development of research method in this study, and where they were adopted from (Saunders & Lewis, 2012). Figure 3.1 presents a graphic illustration of the research onion in this study.

3.1.1 Research Philosophy

A research philosophy approach is the starting point for the research that refers to how a phenomenon is investigated (Bryman, 2016). The main research philosophy

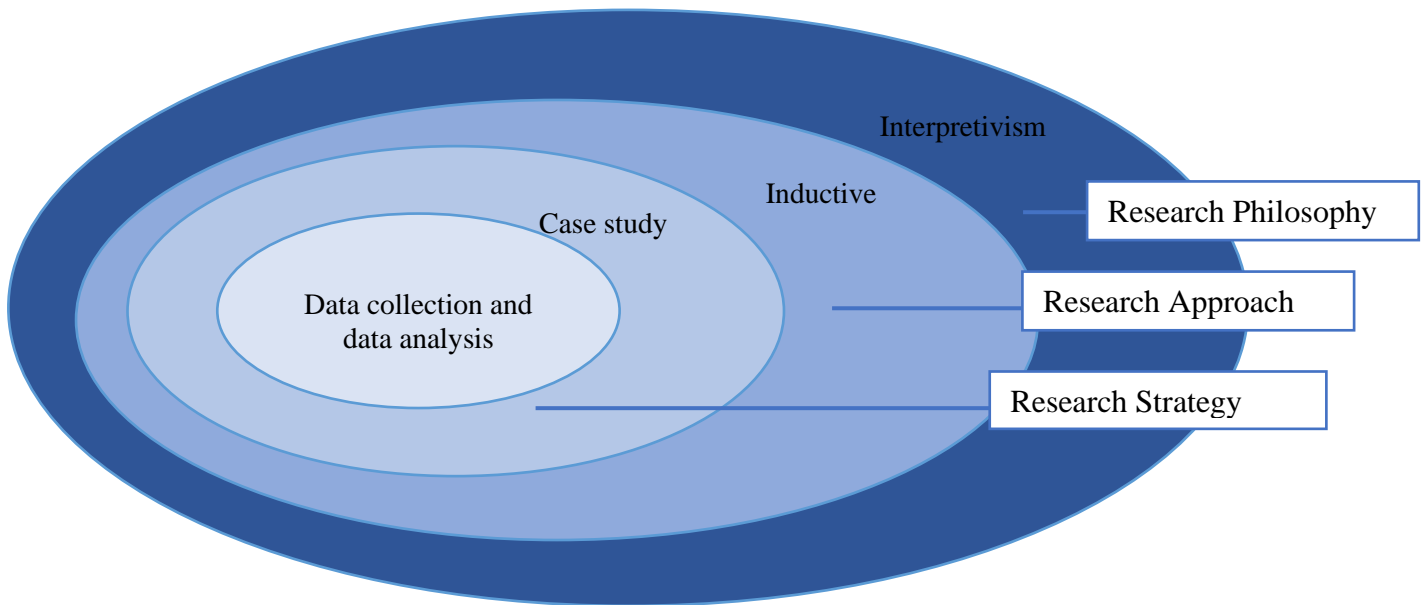


Figure 3.1: A research Onion

approach includes positivism and interpretivism (Patten & Newhart, 2017). The data of positivism is collectable and verifiable to generate general meaning of the phenomena from hypothesis or assumption that is determined by the researchers (Walliman, 2017). Interpretivism, conversely, recognises that each individual or participant views reality differently that endorses the valuable qualitative research approach (Greeff, 2015). In other words, the interpretivism research philosophy helps the researcher in interpreting how participants take part in the situation and why they act in the way they do (Podsakoff, MacKenzie, & Podsakoff, 2012). For instance, Medland (2016) used an interpretivism research philosophy to justify the impact of organic agriculture from the perspectives of farmers, labourers, and trade union representatives in Spain.

In addition, interpretivism has different aspects based on ontology and epistemology. Ontology is the philosophical study of reality that applies neutrally to facts (Maxwell, 2012). In terms of the ontological assumptions of interpretivists, the researchers' view of social reality or social phenomena is subjective as different

people view reality differently depending on their perceptions (Bell, Bryman, & Harley, 2018). Epistemology, conversely, is a branch of philosophy approach underlying the source of knowledge, justification, and the rationality of opinion and belief (Banjara & Poudel, 2016). Knowledge intimately is acquired from the participants and obtained from researchers' experience in Epistemology (Marshall & Rossman, 2014).

The interpretive research philosophy was the most proper approach for this research for the following reasons. First, this research aimed to explore the in-depth assessment of actions, words, and behaviours of certified organic farmers and created the model of organic rice farming. Under interpretivism, researchers required suitable instruments for data collection because they are literally overwhelmed by the responses during data analysis (Eriksson & Kovalainen, 2015). Second, this research specifically associated with the interpretivist assumption that the viewpoint of certified organic farmers is crucial to gain an insightful understanding of *Organic Thailand* certification. Certified organic farmers shared their knowledge and experiences during the interview.

3.1.2 Research Approach

The inductive approach has been conducted in many studies to generalise a concept of organic agriculture. Banjara and Poudel (2016) developed the model of sustainable organic agriculture in Nepal using inductive approach. Regarding the inductive approach, they used the qualitative research design and developed semi-structured questionnaires with organic farmers, policymakers, government authorities, and experts in four districts of Nepal. However, the sustainable model had not been tested and measured.

An inductive approach opposes to a deductive approach that commences with a specific hypothesis or theory that has already been developed. Beuchelt and Zeller (2011) used the deductive approach to examine hypotheses related to organic coffee production system in Nicaragua. The research hypothesized that organic coffee production had lower production cost compared to conventional coffee production. Income data of smallholder coffee farmers and production cost were collected to estimate total per capita income. Siepmann and Nicholas (2018) investigated motives and barriers among winegrowers when converting to organic farms in Germany using both inductive and deductive approach. The researchers, firstly, categorised motives and barriers to convert to organic farms that are relevant to viticulture issues in the European Union from 18 publications. Secondly, researchers conducted semi-structured interviews with winegrowers to establish additional categories. The result of all derived categories indicated five capitals framework that motives organic farmers in Germany.

Specifically many researchers studied the identification of barriers and enablers to implementation of organic practices (Bravo-Monroy et al., 2016; Darnhofer et al., 2005; Patidar & Patidar, 2015b; Pinthukas, 2015), the previous researchers did not identify interactions among those factors which contribute to the farmers' organic implementation. This research conducted an inductive theory-building study focusing on using a qualitative analysis approach to derive connection of barriers and enablers directly from the data. The qualitative analysis approach gathered data that relates primarily to human behaviour and reasoning (Creswell, 2013). Qualitative research was administrated as a comprehensive analysis of farmers' rationale behind the implementation of organic certification.

3.1.3 Research Strategy

A case study research strategy was drawn to establish an insight context between cases in this research. The exploratory research attempts to research towards problems that have not been clearly defined and conceptualised (Van Manen, 2016). To be able to understand a real-life context, a case study approach is well recognised (Crowe et al., 2011; Hakim, 2000; Seppänen & Helenius, 2004). A case study approach is capable of identifying patterns, relationships, or testing theories (Meyer, 2015). Several literature reviews employed a case study approach to obtain an understanding of organic certification. A case study approach was used in 2009 by Jena, Chichaibelu, Stellmacher, and Grote (2012). They collected data from 249 coffee farmers to emphasise what the impact of organic coffee certification on small-scale Ethiopian farmers' livelihoods was. Konefal and Hatanaka (2011) similarly employed a case study approach to examine organic shrimp standards in Indonesia. Their studies developed a qualitative research method associated with document analysis, interviews, and observation to analyse shrimp farming relating to social and environmental issues. Researchers were able to investigate and compare the information within the case studies using a multiple case study research approach (Cooper, Schindler, & Sun, 2003; Crowe et al., 2011; Gustafsson, 2017; Ridder, 2017). This approach also allowed replication between cases and was capable of emphasising the differences between the selected cases in detail (Marshall & Rossman, 2014).

Data analysis from a multiple case study approach is drawn individually and analysed further in different cases. The understanding of the similarities and differences generates wider significant findings from the results due to the wider

determining cases (Gustafsson, 2017). The number of cases depended upon the context of information in each case (Creswell, 2013). However, Malhotra (2011) stated that a multiple case study approach was considered a time-consuming approach and was too expensive.

Case selection

To assess the understanding of what the factors that strongly enable and prevent organic certification are, this research employed a multiple case study approach. The multiple case study approach provided a rich theoretical insight into organic certification, and most importantly, multiple cases allowed the exploration of the insights of each case. Organic farming implementation in Northern Thailand is considered to be at the introduction level (Mingchai & Yossuck, 2008; Sangkumchaliang & Huang, 2012), so this research, therefore, was conducted particularly on certified organic farmers that engaged in organic farming in Chiang Mai, Thailand. All certified organic farmers decided to achieve and maintain organic certification by themselves. The products of all certified organic rice were labelled as *Organic Thailand*.

Furthermore, these certified farmers produced similar types of crop (rice crops as they were commonly produced and played a significant part in the Thai economy.); had similar farm inputs (bio extracts); and used similar farming methods such as manual harvesting to reduce the effect of climate conditions and environmental resources. Each farm, however, implemented organic practices independently in separate farm locations. A representative sampling approach was obtained from the Ministry of Agriculture and Cooperatives, Thailand and utilised by utilising information from 30 certified farmers, and a list of organic rice farmers in the

Chiang Mai district including San Sai, Saraphi, San Pa Tong, Mae Taeng, Omkoi, Phrao, Doi Saket, Mae Rim.

3.2 Data Collection Method

Triangulation

Due to the exploratory research position, a qualitative research method was employed, and triangulation was appropriate to observe the multiple case studies in this research. Basic rules of case study preparation, including data triangulation, were applied as the purpose of this research was to identify what the enablers and barriers that farmers encountered when achieving and maintaining organic certification were.

Triangulation is useful to derive meaning about phenomenon (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). The benefit of triangulation is in conceptualising qualitative research methods (Denzin, 2012). Many types of research have utilised triangulated data, including interviews, observations, and document reviews. Prieto-Sandoval, Mejía-Villa, Ormazabal, and Jaca (2019) studied what the aspects influenced the EU Ecolabel was by using the triangulation method in Spain. The researchers used several collection sources including the EU Ecolabel scheme database, academic literature, and geographic analysis. They also interviewed the EU Ecolabel delegates using semi-structured interviews. The result of the research indicated that public management, communication strategies, procurement criteria, public sustainability, average income, and international trade were the main drivers that encouraged the implementation of Ecolabel.

Oya, Schaefer, Skolidou, McCosker, and Langer (2017) used a triangulation data

collection method to examine the impact of organic certification parties on shrimp producers. In terms of primary data collection, the research was conducted via a semi-structured interview, a survey, and observation or visiting of shrimp farmers' households in Vietnam. Results conclude that the barriers to farmers becoming certified were the information systems and a restrictive marketing channel.

By recognising the value of a triangulation data collection method, academic literature provided valuable evidence and knowledge relevant to certifications and standards. Triangulation was used to collect data and improve the accuracy of researchers' judgements (Denzin, 2012). The triangulation data collection method was used to assure the validity of this research. The data collection instruments, which included interviews, observations, and document reviews, are discussed below:

Firstly, qualitative data was collected through semi-structured interviews. Semi-structured interviews with certified organic farmers were mainly used in this research to access the principal factors surrounding the implementation of organic farming. This research carried out face-to-face semi-structured interviews to gain knowledge from up to 30 certified organic rice farmers, which were mostly farm owners who implemented organic farming and applied for certification. The interviews used open-ended questions, allowing the certified farmers or respondents to discuss farmers' perception and interpretation in regard to the discussed topic (Brinkmann, 2014). It is noted that to produce valid responses from respondents, the open-ended questions should be well-designed and able to give precise responses (Marshall & Rossman, 2014).

This research was rewarded with 30 eligible cases which are exceptionally rich, and full of trustworthy insights. Insightful research results are necessary for a qualitative research method (Arendsdorf & Naylor-Tincknell, 2016; Garrett-Staib & Maninger, 2012). With permission from farmers, each farmer was audio recorded during the interview, which ranged from 30 minutes to 60 minutes. The interview was recorded by using a digital recorder after being given permission from farmers. Recording the interviews increased the accuracy of the transcripts.

Secondly, this research examined several sources of document reviews related to organic certification. The primary data source was provided by The Agricultural Standards Committee who issued the Thai Agricultural Standard on Organic Agriculture. The database allowed the total number of certified organic farmers in 2016 in Chiang Mai, Thailand, to be counted. The Agricultural Standards Committee also provided documentation of organic certification requirements and processes. This documentation was issued by the Agricultural Standards Committee in 2009. Furthermore, the certification documents such as inspection reports, farm history, list of farm inputs, production plans, and government reports were initially reviewed to extend the understanding of organic certification. The academic literature reviews have utilised archival data in this research.

Finally, observations were used in data collection methods to ensure the triangulation information, which in turn, provided substantial validity of the information. Observations provided interesting insights related to a phenomenon when the interview and document reviews were not sufficient to discover a phenomenon (Cooper et al., 2003; Crowe et al., 2011; Van Manen, 2016). On-farm organic practices were observed, and photos were taken during this research, which

was written in accordance with what was recorded during the interview, in order to observe the farm environment, farm appliances used for seeding and harvesting, and farm infrastructure. Moreover, methods of how farmers implemented organic farming practices such as seeding, soil management, pest management, and harvesting were observed in action. For example, the buffer zone of each farm had a varied width and length, from one to three meters. The buffer zone was constructed from bamboo, longan, or ridge. These observations helped discover new perspectives, behaviours, and interesting phenomena that may not have been mentioned before, through the interview and document reviews (Brinkmann, 2014; Maxwell, 2012; Meyer, 2015). Consequently, three data collection methods (or a triangulation research approach) were designed based on the enablers and barriers in achieving and maintaining organic certification.

3.3 Data analysis and integration

Data analysis is a process to explore data and identify patterns to test research hypotheses or disprove theories (Hakim, 2000; Malhotra, 2011). Figure 3.1 presents a graphic illustration of the research methodology in this research which shows that data analysis in this research was adopted (Balzarova & Castka, 2008; Druskat & Wheeler, 2003). After (1) the selection of certified organic rice farmers as a sample, (2) data was collected for each case, and (3) this data was analysed to determine a set of enablers and barriers. The data analysis addressed the pattern of data collection by examining, analysing, evaluating, and categorising data (Marshall & Rossman, 2014). In this research, data analysis consisted of two phases: (1) content analysis, and (2) data integration and model development.

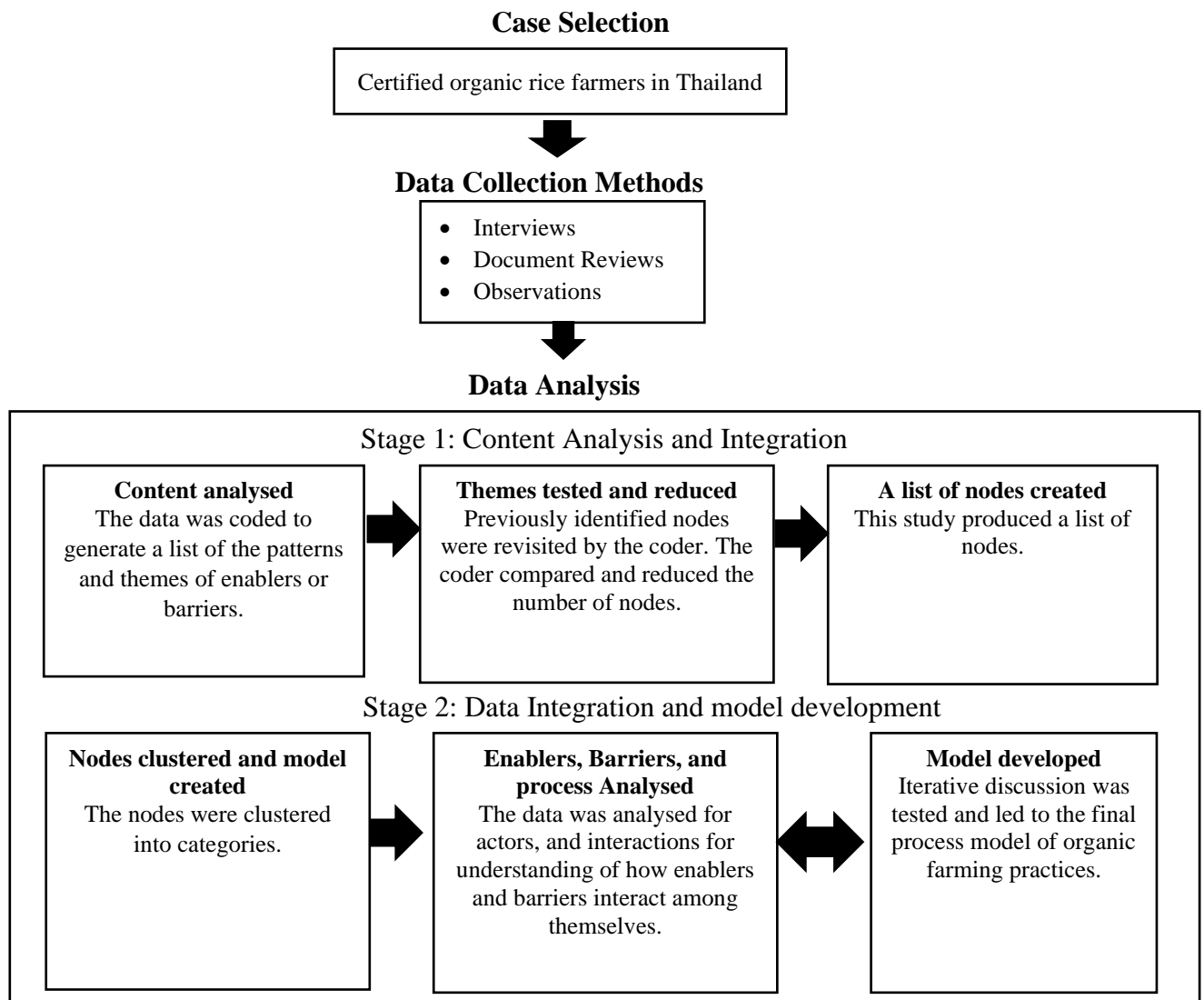


Figure 3.2: An overview of the data gathering and data analysis stages

Stage 1: Content analysis

Content analysed: Content analysis is generally used in qualitative research (Maxwell & Loomis, 2003; Meyer, 2015; Neuendorf, 2016) and a process for the examination of patterns of raw data including interview transcripts, documentation, pictures, and video (Hsieh & Shannon, 2005; Mayring, 2004; Stemler, 2001). In content analysis, the analysis process starts with reviewing previous studies as guidance for initial codes (Hsieh & Shannon, 2005). The next process represents the organising of qualitative data by using a coding process, then creating categories or

themes (Neuendorf, 2016). Coding is a process of identifying the context that researchers had noted while doing research and creating categories (Kothari, 2004). Results from coding are the list of categories or themes that provide descriptions of the phenomenon (Stemler, 2001). Cooper et al. (2003) stated that after creating a list of categories, another list of categories was formulated again between these lists by collapsing similar categories or expanding dissimilar categories.

Some studies used content analysis for assessing knowledge relating to organic certification. Seufert, Ramankutty, and Mayerhofer (2017) used content analysis to assess the reputation of organic regulations in some representative countries such as India, Mexico, Argentina, Austria, the Falkland Islands, the USA, and France. The researchers aimed to assess several management practices that might reflect organic agricultural concepts. The analysis process started with describing management practices of food and livestock production. After that the researcher listed key organic principles, based on organic requirements. The researcher then identified and explained seven key organic principles were in each management practice. Furthermore, two independent researchers carried out the coding as well as inter-rater reliability to increase the reliability of research.

Konefal and Hatanaka (2011) conducted a content analysis with three data collection instruments in Indonesia to develop an understanding of shrimp certification. Firstly, researchers analysed documents of certification bodies, websites, newsletters, and reports. Secondly, researchers conducted semi-structured interviews with some environmental and governmental officials. Thirdly, researchers visited shrimp projects, and observed ponds and warehouses. The findings of this research indicated that science and technology development was

needed to ensure compliance with standards.

In this research, the researcher conducted the content analysis to assess organic practice conceptualisation, particularly, what the enablers and barriers were in achieving and maintaining organic certification. The content analysis brings benefits to the researcher as it can investigate large volumes of content even if they originate from different sources (Huberman & Miles, 2002).

The first step of data analysis was to perform the first round of coding to create the first set of codes. The researcher coded all 30 transcripts from 30 certified organic farmers. The transcribed interviews were assigned identification numbers (Farmer 1, Farmer 2,, Farmer 30) and uploaded into a qualitative software programme, NVivo 12 Plus. NVivo software is a qualitative software program used to assist the process of coding, create thematic categories, and generate conceptualisation (Hatanaka, 2010; Janssen & Hamm, 2011). This research outlined both inductive and deductive coding approach. The inductive coding approach complemented the research questions whereby the researcher interpreted data to develop a set of themes that relevant to research objectives. The deductive coding approach complemented after the inductive coding approach to formulate common underlying themes and defined them in codebook as a reference to guide the researcher through the coding process. Each code represented sentences, phrases, and paragraphs from the transcripts that were coded inductively and deductively into individual nodes to answer the following research questions: (1) What were the enablers that farmers encountered when achieving and maintaining organic certification? (2) What were the barriers that farmers encountered when achieving and maintaining organic certification? And (3), How did the barriers and enablers

interacted with each other in regard to the achieving and/or maintaining of organic certification? The codes, therefore, led to the conceptualisation of organic farming practices. This research derived a list of 64 individual nodes at this stage.

Themes tested and reduced: The next step was the categorisation process. The researcher reviewed each quote and removed quotes that were not relevant to the description of themes. This research categorised themes by dividing codes into nodes (main themes), and child nodes (sub-themes). Nodes represented the code of enablers and barriers in achieving and/or maintaining organic certification. Child nodes represented a similar contribution to each node. Figure 3.3 represents examples of node and child nodes that identified the establishment of knowledge growth in achieving and/or maintaining organic certification. Child nodes represented any reference that relates to (1) farmer's knowledge enhancement from family member, or colleague (the other organic farmers) (2) farmer's knowledge enhancement from external organization such as government, university, and organic network and (3) farmers' self-discipline to study about organic certification knowledge.

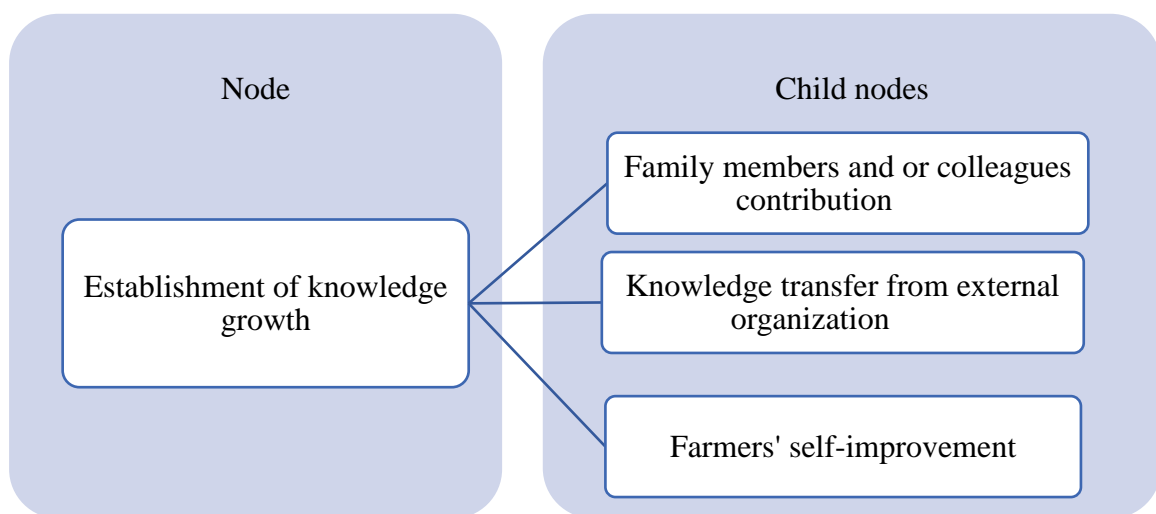


Figure 3.3: An example of nodes and child nodes

After researcher finalised a list of nodes, a description of each particular node was

provided and an explanation of 20 nodes was described in detail in this stage. For instance, the node that was named ‘auditors who contributed positively toward certification process’ was defined as auditors who played a positive role during certification. This node captured the quotes that describe specific situations, such as when farmers did not feel intimidated by auditors or were not worried about the reliability of the auditors. It is important to create coding rules as guidelines for the coding process (Huberman & Miles, 2002; Saldaña, 2015).

The next stage distinguished the similarities and differences amongst the data (Corbin & Strauss, 2008). The interrater reliability (IRR) is a measure of agreement level between independent coders (Marshall & Rossman, 2014), and is necessary to increase the reliability of qualitative research (McHugh, 2012). In this research, interrater reliability was chosen to find the consistency of coding of themes between two coders: (1) researcher and (2) supervisor. Each coder separately carried out coding processes to reduce the variability among multiple coders. Miles and Huberman (1984) mentioned the importance of evaluating the different interpretations of each coder. Each individual had a different view of the same phenomenon. Thus, coding reliability was handled by utilising Interrater Reliability Testing (IRR) to test the degree of agreement between two coders. At this stage, the researchers took a sample of three certified organic farms, which accounted for 10 percent of the total farms, to run the IRR test. The result of the IRR was a 90 percent agreement, which is considered high agreement and acceptable by (Miles & Huberman, 1984). After researchers conducted Interrater Reliability Testing, the results can be considered reliable (LeBreton & Senter, 2008).

Stage 2: Data integration and model development

Lenzerini (2002) stated that data integration converted the data from disparate sources into valuable information, which was commonly used in qualitative research methods. Through the data integration process, data is integrated to explain the situation, in line with data interpretation from several sources such as data sets, documents, and transcripts (Doan, Halevy, & Ives, 2012).

Nodes clustered and model created: At this stage, the researcher interpreted and integrated the data to find out a novel explanation of the data. The interpretation of developed an informed conclusion (Maxwell & Loomis, 2003; Zorn, Lippert, & Dabbert, 2012). The researcher stepped away from the nodes and reviewed the similarities and differences among the nodes. Then, the researcher grouped certain nodes together to create new grouping nodes. The new grouping nodes were considered as the novel interpretation of an organic farming practices concept. As a result, the grouped nodes became the *actors* of the model.

The researcher went back to the data and analysed it to see if the narrative captured by the nodes reflected the new cluster. Each cluster was discussed in the findings chapter. Cluster analysis has been widely used in qualitative research methods and was therefore suitable for this research. For instance, Balzarova and Castka (2008) used a dendrogram method, which was one of the cluster analysis techniques to create main clusters from initial nodes. The result of cluster analysis revealed main clusters that influenced the maintenance of ISO 14001 certification. Henry, Tolan, and Gorman-Smith (2005) identified key benefits of cluster analysis as an applicable method for classifying information into groups by arranging similar and dissimilar information. All clusters and how clusters were connected among

themselves were presented in detail in Chapter 5. For example, data consistently interpreted that some farmers had a lack of knowledge about how to prevent pests, weeds, and diseases, leading to a connection between farmers and the availability of resources and skills shown in the framework.

Model developed: Following on from the previous step, the researcher reviewed the data and discussed it with the coders for any agreement or disagreement of a conceptual model. During or before the data collection process, certified organic farmers were not contacted early enough by other researchers. There is no comprehensive data or data analysis which is relevant to organic farming practices and the *Organic Thailand* certification. Comprehensive data analysis in this research led to a preliminary concept of how barriers to implementing organic certification can influence the process of the production and interaction of various certification bodies, and the adopters of *Organic Thailand* certification. Consequently, the model of Thai organic farming is discussed in Chapter Five.

Chapter Four

Findings: Enablers and Barriers to Achieving and Maintaining Organic Certification

4.0 Introduction

Organic rice farming practices involve a farm converting from conventional to organic practices. During this conversion stage, farmers prepare the relevant documents for auditors to guarantee that the farm had not been using synthetic fertilizers and pesticides. Preventing entry of chemical contamination from neighbouring conventional farms into the organic farm is of utmost importance. In terms of soil preparation and management, farmers cultivate legumes, organic manure or rotate deep-rooting plants, and incorporate organic materials and livestock manure into the soil to increase soil fertility. The prevention of pests, weeds, and the management of disease, thus, creates a balanced ecosystem of living organisms with the intended purpose of increasing the yield of farm crops and improving the farm's effectiveness. Farmers implement appropriate pest, weed, and disease management processes and methods to maintain healthy organic farms and prevent the aforementioned inhibiting factors.

As part of the certification process, farmers are required to use organically grown seeds, which are seeds that have not been exposed to any synthetic chemicals. Chemically treated or synthetic fungicide contaminated seeds are prohibited and must be properly removed before use. The reward of growing organic products is harvesting. Harvesting is the process of collecting mature rice crops, which usually reach maturity at around three to five months after crop establishment. The start of

the season begins with sowing the seeds around July, and rice harvesting in Thailand usually begins in October and takes from three to four months through to December or January.

A qualitative data analysis method was applied to this research (see Chapter Five). Qualitative data was sourced from (a) semi-structured interviews with certified organic rice farmers, (b) the Thai Ministry of Agriculture and Cooperatives' Standard on Organic Agriculture, and (c) informal researcher observations of organic farming practices. Thirty certified organic rice farmers (from here on in, farmers) were interviewed. By the time they were interviewed, these farmers had already been certified and had started implementing organic rice farming in Northern Thailand. The certification was awarded based on the Thai Ministry of Agriculture and Cooperatives' Standard on Organic Agriculture.

The semi-structured interviews were conducted with farmers to identify the enablers and barriers to achieving and maintaining *Organic Thailand* certification. Interviews were recorded, transcribed from Thai to English, and then coded using content analysis. The analysis was completed against the formal certification criteria as determined by the Thai Ministry of Agriculture and Cooperatives. The Ministry of Agriculture and Cooperatives administers organic certification in Thailand. When farmers receive *Organic Thailand* certification, they are able to use the *Organic Thailand* label.

Under the certification process, farmers are asked to meet six related requirements: (1) farm conversion to organic practices; (2) prevention of chemical contamination from neighbouring farms; (3) soil preparation and management of organic farms; (4) pest, weed and disease prevention and management on organic farms; (5)

organic seed sourcing and reproduction on organic farms; and (6) organic rice harvesting and post-harvesting. This chapter details the findings.

4.1 Farm conversion to organic

4.1.1 Background information

To begin organic farming operations, the first requirement that farmers need to consider is the condition of the farm. Different farms possess different land conditions. This research found that twenty out of the thirty farmers started organic farming on *pristine land*. Pristine land is a land condition where no chemicals have been used prior to organic farming: two-thirds of the farmers interviewed met the requirements defined for the farm conversion to organic. As such, these twenty farmers were not required to convert from inorganic to organic. As one farmer said:

“I did not lose any time during the stage of farm conversion to organic. I have not used chemicals in this area since 1986. I only run my farm based on organic principles” (Farmer 13).

However, according to certification requirements, ten out of the thirty farmers were required to go through the process of a twelve-month conversion stage, at the least, due to excessive use of chemicals prior to organic farming implementation. During the conversion stage, the soil is allowed to naturally improve to become ready for organic farming operations. Auditors typically observe farms, gather farm information, and certify organic status along with documenting the specification of each farm’s current conditions. Farmers need to provide evidence by submitting materials to the certifier. These materials include things such as farm input records

and crop production records. Recommendations regarding further developments are also provided to farmers at this stage by the certifier.

Despite the requirement to have at least a twelve-month conversion stage for those farms which displayed evidence of excessive use of chemicals prior to organic farming implementation, among the farmers interviewed, the average length of the conversion stage was only around three years. The longest time taken to complete the conversion stage was almost five years, because this particular farmer (Farmer 25) had no prior organic farming experience and had continued using chemicals up until they decided to convert from a conventional to an organic farm. Farmers who stopped using chemicals prior to applying for *Organic Thailand* certification had a much shorter conversion stage than those required by the certifier. For the ten farmers who went through the conversion process, each started by reducing chemical usage, and then they gradually adopted organic treatments on their farms. As one interviewee mentioned:

“The first year of the conversion stage was the toughest time. Every farmer would face problems. Even experts or researchers could not help them. Farmers were emotional and felt frustrated. At that time, the buffer zone was still under construction. It could not help to prevent chemicals or pests. Not a lot of farmers can get through the first year”
(Farmer 17).

Figure 4.1 illustrates the farmers’ responses. Fifty-eight percent of the responses from farmers were barriers. This suggests that most farmers choose to dwell on the negative aspects of the conversion stage, and therefore the initial conditions of the

farm are seen as a barrier preventing farmers from adopting organic farming practices. However, farmers also identified a number of enablers at this phase of organic rice production.

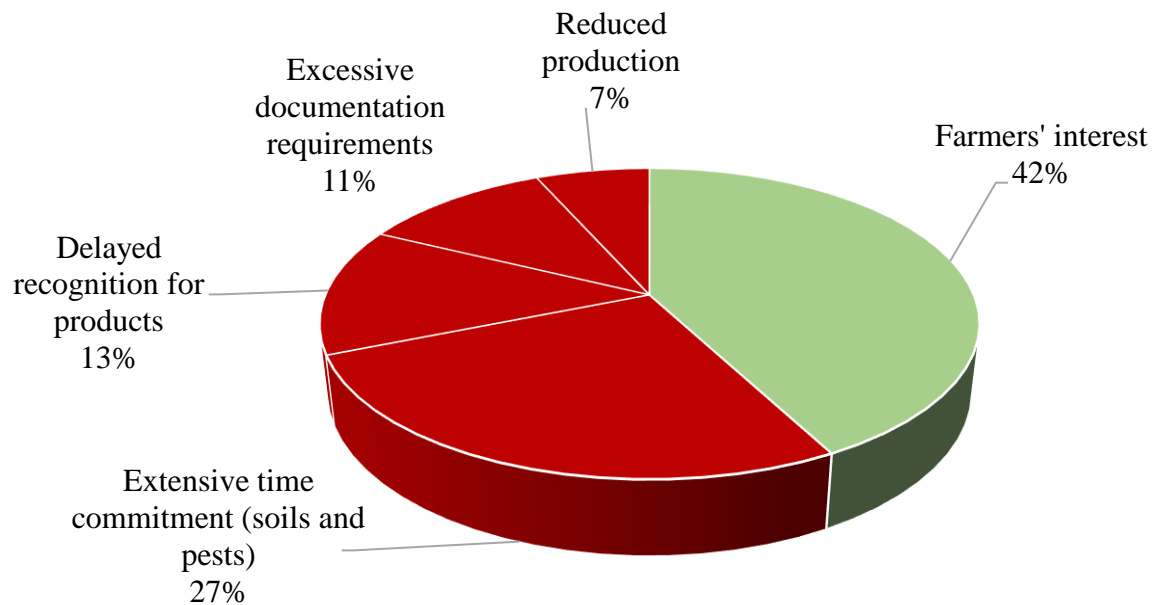


Figure 4.1: Enablers and barriers related to the conversion stage towards achieving and maintaining *Organic Thailand* certification.

4.1.2 Enablers during the farm conversion stage

An *enabler* is a factor that positively assists farmers in achieving and maintaining organic farming practices, leading to certification and maintenance. During the conversion stage, enablers were factors that contributed to transitioning (including those which had no formal conversion stage) towards organic farming. During the conversion stage, one enabler was identified to have positively assisted farmers.

Farmers' self-interest.

Eleven of the thirty farmers explained why they decided not to use chemicals on their farms prior to certifying their farms as organic. Reflecting on the initiation to be certified and the conversion stage, some farmers revealed how their decision to farm organically was due to their positive attitudes towards organic farming and the

health benefits that were expected to accrue. I have referred to this enabler as *farmers' self-interest*. This is because farmers appeared to be interested in organic farming for their family's well-being, alongside their own. They wanted to consume healthy food such as organic fruits, organic vegetables, and organic rice. It was a conscious decision to improve their lives and therefore was a huge motivator. As one farmer said:

"I started organic farming because a lot of conventional farmers and their family had health problems. Most of them did not live long. I thought I had a choice to live longer." (Farmer 5).

During the conversion stage, to guarantee that the farm had not been using chemicals, farmers had to prepare relevant documents for auditors. The relevant evidence included land ownership documents or pictures of the farm. Eight farmers explained that they prepared all the evidence before they started their organic farming operations. My interpretation of this is that farmers were fearful of government bureaucracies and did whatever they could to avoid any confrontation, and therefore acted out of their own self-interest by being disciplined and careful about the processes and preparing appropriate documentation. As another farmer explained:

"I took pictures before I started farming. They were my evidence. I also prepared land ownership documents for the auditors. You should have documents to guarantee the history of your production location." (Farmer 18).

The key enabler here was farmers' self-interest, which contributed to transitioning (including those which had no formal conversion stage) towards organic farming. Farmers believed that their self-interest in their well-being and being disciplined in documentation positively assisted them in becoming a certified organic farmer and retaining that certification.

4.1.3 Barriers during the farm conversion stage

A *barrier* is a factor that farmers believe hindered their transition to becoming a certified organic farmer or retaining *Organic Thailand* certification. During the conversion stage, farmers experienced several barriers: (1) extensive time commitments (soil and pest management), (2) delayed recognition of products, (3) excessive documentation requirements, and (4) reduced production.

Extensive time commitments (soil and pest management)

Farmers mentioned the excessive time necessary to prepare their soil for *Organic Thailand* certification. One of the main purposes of soil preparation was to increase organic matter or plant and animal residues in the soil. Organic soil should contain between three to six percent organic matter to provide nutrients to produce and to improve the water holding capacity of soil. There were several soil preparation methods farmers engaged in. One of the time-consuming methods needed in organic farming is crop rotation. Crop rotation is required in order to replace nutrients in the soil under organic farming, which would normally come artificially through inorganic fertilisers when farmed conventionally. Another time-consuming process was the need to make or source organic compost for fertilisation to replace synthetic fertilisers. As one farmer mentioned:

“Preparing organic soil was not easy. I had to reduce chemical contamination in the soil and then start to produce organic fertiliser. If the soil still contained chemicals, we would not be able to obtain the certification. Therefore, it took a very long time to prepare soil.”
(Farmer 21).

Farmers found it troublesome to control pest issues during the farm conversion stage. As another farmer explained:

“The number of pests and weeds was found to be higher than usual.”
(Farmer 20).

One of the reasons preventing a smooth conversion stage was the continuous usage of chemicals to control pests over many years. Farmers indicated there was an increase in pests and pest related issues when transitioning to organic crops as the use of chemical pesticides was suspended. A number of farmers mentioned how it took an excessive amount of time to control and prevent pests. Using manual pest control methods, such as nets and bio-extracts, was seen to be time-consuming during the period of transitioning from conventional to organic farming.

Delayed recognition of products

The delay in the recognition of their products as organic on the market is another barrier. During the farm conversion stage, farmers were unable to gain the organic price premium because they had to sell rice at the conventionally farmed price while transitioning towards certification. Six farmers reported that their organic

rice products were not able to be labelled as organic before they were certified. As one farmer said:

“.... During the conversion stage, I decided to sell rice paddy at the normal price. I lost time and money during that period....” (Farmer 04).

Excessive documentation requirements

There are excessive documentation requirements from the relevant Thai authorities (governmental officers who oversaw the land ownership documents and requirements). For some farmers, being diligent with the preparation of documents was a positive enabler. For other farmers, processes associated with finding evidence (including land ownership documents and pictures of farms) was a negative experience. Five interviewees explained that the problems were to do with difficulties in contacting the Thai authorities. Five farmers invited the authorities to visit their farms to explain the farm conditions. As one farmer said:

“...I invited the authorities to inform the auditors about the condition of this farm from the past. It was very difficult to contact these government agents. ...’ (Farmer 22).

Reduced production

The fourth barrier was a reduction in crop yield during the farm conversion period. Three farmers discussed the lower yield by stating that the organic crops yielded from their farms decreased and the conversion was slow. The problem during the conversion period was that soils took a long time to take on organic matter for the production of rice. It was not simply a matter of stopping the use of synthetic

chemicals and using organic materials, all the while maintaining the same level of production. Farmer 11 compared the volume of yield during the conversion stage.

‘During the first year of the farm conversion to organic stage, I obtained 500 kg of crops per 0.16 hectares. The conventional yield used to be about 800-1000 kg per 0.16 hectares.’ (Farmer 11).

Farmer 15 explains the time taken and the yields:

“The production decreased even after I used a lot of organic treatment. Organic treatment was not very useful. Most of my friends stopped implementing organic farming during the conversion stage. Production decreased rapidly because the organic treatment took a long time. The organic treatment needs to be at least 3 years.” (Farmer 15).

Farmer 20 also explains the time taken against the yields:

“For example, in the first year of the conversion stage, the production was one ton. In the second year, production reduced by approximately 20-30 percent. In the third year, there was a production increase of 85-90 percent. In the fourth year, the production increased by about 120 percent because of the changes in the soil conditions. Soil increases the capacity to absorb and collect organic treatment with each year.” (Farmer 20).

The key barrier here was the particular negative experiences farmers faced when becoming a certified organic farmer. These negative experiences came in many different forms: extensive time commitments (soils and pest management), delayed

recognition of products, excessive documentation requirements, as well as reduced production. Farmers believed these experiences negatively impacted them or hindered their ability to prevent cross-farm chemical contamination.

Table 4.1: Enablers and barriers related to farm conversion to organic

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
Farmer' self-interest	19	20
Barriers		
1. Extensive time commitment	12	14
2. Delayed recognition of products	6	9
3. Excessive documentation requirements	5	5
4. Reduced production	3	4

Table 4.1 summarises farmers' responses in relation to the factors that promoted or hindered their ability to deal with the conversion stage.

4.2 Prevention of chemical contamination from neighbouring farms

4.2.1 Background information

Despite the fact that organic farming strictly prohibits the use of all synthetic chemicals, according to *Organic Thailand* certification, there are still chances that organic farms can be exposed to chemical contamination from neighbouring farms. This research found that twenty-seven out of thirty organic farms, which were surrounded by conventional farms, were easily contaminated by chemicals, pesticides, and synthetic fertilisers. Most conventional farmers were not willing to change their farming behaviour because they had been using chemicals and pesticides for a long time and were comfortable doing so.

Conventional farmers typically expressed that using chemicals was easier than producing or using organic fertiliser. When conventional farmers applied chemicals to their farms, the contaminated air usually infiltrated nearby organic farms. The organic farmers, in this research, mentioned the need to create protections against such contaminations from neighbouring farms. Two out of thirty farmers rented empty lands beside their farms to avoid the spreading of contaminants from conventional farms. Only one out of the thirty organic farms were not located near any conventional farms and therefore there was little risk in cross-farm contamination.

The prevention of chemical contamination is required by *Organic Thailand* certification, especially when organic farms are surrounded by conventional farms. Twenty-seven farmers in this research initially needed to create barriers, ridges, or plantations as buffer zones to make sure that there would be no risk of chemical contamination through soil, water, and air from polluted areas. A buffer zone, or a natural protection zone, is an area located between a certified organic farm and a conventional farm.

Figure 4.2 illustrates the farmers' responses. Seventy-four percent of the responses from farmers were barriers. That is, most farmers chose to dwell on cross-farm chemical contamination. They are seen as conditions preventing farmers from implementing organic farming practices. However, farmers also saw a number of enablers at this stage of rice production.

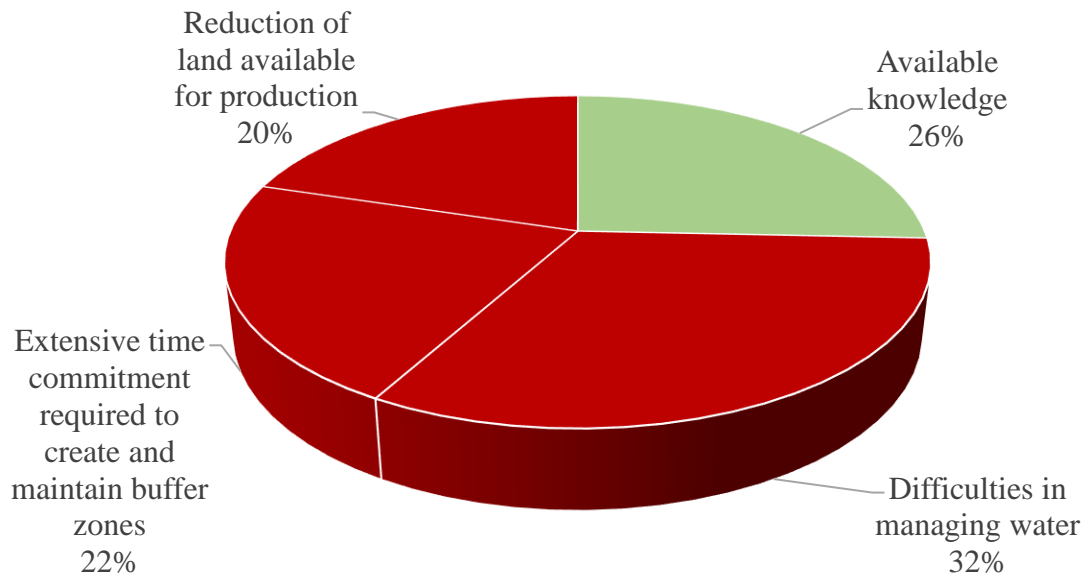


Figure 4.2: Enablers and barriers related to prevention of chemical contamination from neighbouring farms towards achieving and maintaining *Organic Thailand* certification.

4.2.2 Enablers

An *enabler* is a factor that farmers believe positively helps them in becoming a certified organic farmer and retaining that certification. Under this criterion (chemical contamination), an enabler was any factor which contributed to preventing chemical contamination from neighbouring farms. To prevent chemical contamination from neighbouring farms, one enabler was found to have positively assisted farmers during the transition period.

Available knowledge

Ten farmers sought out knowledge on how to prevent chemical contamination by themselves prior to applying for certification. As one farmer said:

“After I searched for how to prevent chemical contamination by myself, I grew bamboo trees, longan trees, and banana trees between my farm and the conventional farm.” (Farmer 13).

One way of avoiding cross-contamination with conventional farms was to separate the water supply. Apart from farmers’ self-study (mostly searching on the internet), nine farmers also reported that they received support from family members (e.g. husbands, wives, parents) to deal with the prevention of chemical contamination. As another farmer said:

“Building water valves did not require a huge amount of money but required a lot of experience and good water management skills. My husband knew how to build water valves. He was experienced in farming and was dedicated to help.” (Farmer 1).

External organisations such as government departments, universities and local communities assisted farmers in building reservoirs and provided beneficial suggestions. As one farmer said:

“I was worried about water management. Water management was a very difficult issue. I asked experts from the Land Development Department. They suggested that I should build a reservoir. I built one reservoir by hiring labourers to dig (40 metres wide x 60 metres long x 6 metres deep). This reservoir contains about 1,675 cubic metres of water. It is enough for 1.44 hectares of production area.” (Farmer 5).

Farmers also mentioned that they attended organic farming workshops and applied the knowledge to their organic farms. Workshops were organised by the government. As another farmer explained:

“Government agents from the Agricultural Extension department usually organised workshops every month. They suggested establishing a 3-metre buffer zone width.” (Farmer 27).

University lecturers organised workshops relating to organic farming knowledge, including how to grow water plants and prevent water pollution. As one farmer mentioned:

“I built a water system from the local canal to the reservoirs. It was not easy because I did not have experience. I grew water plants, such as water fern and water mimosa because it helped to dispose of chemical contamination in the water. I did not know about this until I attended workshops at Maejo University.” (Farmer 28).

Another farmer also mentioned:

“I grew water plants such as water fern to absorb chemical contamination. I obtained most of my knowledge about organic farming from the workshops held by Maejo University. They usually organised a workshop about organic farming almost every month.” (Farmer 29).

A local community, together with farmers, provided a collaborative direction towards water pollution issues. As one farmer said:

“A local community was concerned with water pollution, but we had to prevent water pollution by ourselves because most farmers did not realise the adverse effects of water pollution. They are still using chemicals in farming. If I succeed in organic farming, there would be more farmers who would be interested in organic farming.” (Farmer 20).

The key enabler here was the knowledge available to farmers about how to prevent chemical contamination from neighbouring farms. That knowledge came in many different forms: through the internet, from family members, from outside organisations such as government departments and universities, as well as from local community members. Farmers believed that this knowledge, from these sources, positively assisted them in becoming a certified organic farmer and retaining that certification.

4.2.3 Barriers

Again, a *barrier* is a factor that farmers believed to have a negative impact on their ability to prevent chemical contamination from neighbouring farms. Twenty out of the thirty farmers identified that it was very difficult to prevent chemical contamination, because their farms were surrounded by conventional farms. As one farmer mentioned:

“Preventing farms from chemical contamination was considered as one of the most significant problems, especially when my farm was surrounded by conventional farms. This is because chemicals from conventional farms always spread over to my farm.” (Farmer 2).

Here, the particular negative experiences farmers faced when becoming certified organic are described. To prevent chemical contamination from neighbouring farms, farmers experienced several barriers: (1) difficulties in managing water, (2) the extensive time commitment required to create and maintain buffer zones, and (3) reduction of land available for production.

Difficulties in managing water

Organic farms require water resources throughout the year. Water supply for agricultural activities consists of upstream and downstream water flow. For upstream communities, water supplies are perceived to be abundant and uncontaminated, given the natural conditions that make them easily accessible. On the other hand, downstream farmers usually manage water supplies through community-based participation to keep the water usable and accessible. Water allocation is when farmers access a downstream water flow based on a queuing method. Each farm must line up to access water from a small water dam or weir that is distributed from local irrigation canals.

Farmers were faced with several issues, such as water pollution and limited water resources. Twenty-four out of the thirty farmers mentioned several water management barriers including (a) chemical contamination in farm irrigation and (b) the lack of water management knowledge.

Even though reservoirs were used to help store water, farmers were faced with contaminated water due to tribal villagers' methods of using water from upstream water flows. There have also been many cases of water pollution due to factory waste. Farmers were suspicious of the water quality from canals as there had been a case of salinity waste. Without the proper sewerage management system, polluted

water upstream would pollute the water downstream. The government has not been effective in enforcing strict measures to ensure that tribal villagers are using upstream water properly. There were several reports of water being contaminated due to tribal villagers disposing of chemical waste from their farms. According to farmers, these tribal villagers illegally implement conventional farming deep in the prohibited mountain areas, which causes upstream water flow to become contaminated. Furthermore, these farmers mentioned they were not successful in dealing with the tribal villagers to manage water quality and watersheds in farming areas.

Chemical contamination in farm irrigation was a barrier to organic farming. Some water pollution was caused by factories, as organic crops and factories share and use the same sources of water. For example, when textile factories drained waste products into local canals, the polluted water then ran from local canals to organic crop areas. Farmers had to be aware of water pollution and know how to dispose of chemicals without polluting the water. Chemical contamination in farm irrigation also deteriorated water quality. As one farmer mentioned:

“This farm obtained water from local canals and rivers. Water sources relied on local irrigation management. Last year, I was faced with the problem that chemical waste from factories was dumped into the local canal which then moved to my farm. Water pollution was so harmful because it was contaminated with chemicals. Water pollution occurred when chemicals from a textile factory washed down their drains.”
(Farmer 1).

One important reason why farmers were forced to use contaminated water was because of limited water supply sources, and due to this were not many viable sources of water supply for organic farming in Thailand. Farmers explained that they sometimes did not possess adequate water supplies during the dry season. As one farmer said:

“Preventing water from chemical contamination was very difficult because farms are not organic around this village. They use chemicals on their farms. The problem was that we obtained water from the same local water sources including canals and rivers. Local canals and rivers were the only sources of water. I was not able to do anything.” (Farmer 14).

It confirmed that water management was not an easy task to overcome because farmers did not have adequate water management knowledge. Thailand has been facing a drought situation for over several decades (Maksup, Roytrakul, & Supaibulwatana, 2014). Polthanee, Janthajam, and Promkhambut (2014) found that the drought situation reduced farmers’ incomes and rice production. Farmers had to plan their water usage and store water supplies in advance to cultivate rice, particularly in the dry season. While government departments have been enablers in offering solutions to problems around cross-farm contamination, farmers say there is more of a need for the government to create a *sustainable water resource management* plan in order to support agricultural water systems. According to farmers, this should include building a reservoir, managing the flow of water supplies, managing water levels in farms, building ridges, and growing water plants.

Some farmers did not know that they needed to build reservoirs, and instead grew water plants based on their own research such as lotus, water mimosa, and water fern, because each water plant typically helped with absorbing chemical contamination.

Extensive time commitment required to create and maintain buffer zones

When farmers need to prevent cross-farm chemical contamination, they require extensive time. In Thailand, the size of an organic farm varies from as large as twelve acres to as small as 0.4 acres. The average farm size is two acres. *Organic Thailand* certification requirements do not specify the width of the buffer zone, but farmers should provide an adequate buffer width to prevent prohibited substances from contaminating organic rice crops.

Sixteen out of the thirty farmers mentioned that the extensive time commitment in creating and maintaining buffer zones was one of the barriers. As one farmer mentioned:

“For the buffer zone, I used to grow banana trees, but they did not last very long. After that, I decided to grow bamboo trees and build fences. I had to study everything by myself. I studied the certification requirements by myself. It took as long as four years to create and maintain a buffer zone.” (Farmer 18).

Some farmers were required to rebuild buffer zones in response to auditors’ suggestions. As one farmer said:

“After auditors inspected my farm, they found a problem with the buffer zone. They suggested to me to extend the buffer zone by two metres. I was not certain that I could rebuild the buffer zone in time. I hired ten labourers to help me because I was afraid that I could not meet the deadline.” (Farmer 4).

Reduction of land available for production

The reduction of land for rice production, due to the land required to act as a buffer, is another important barrier. The average width of the buffer zone for farms in this research was approximately three meters from the boundary to the production area, which worked out to be on average 16.23 percent of the total land area of all 30 farms. One-third of farmers who owned smaller land areas had to utilise twenty to twenty-seven percent of the land area to create buffer zones. This is a very significant reduction in farming area compared to larger farms where only around ten percent of the land area was utilised as buffer zones. As one farmer mentioned:

“I built a buffer zone of three metres after I studied the Organic Thailand certification requirements. The buffer zone reduced the farming area.” (Farmer 11)

Another farmer also mentioned:

“It was difficult to build my own reservoir in this area because I did not have a large production area. I had to divide the production area to build the buffer zone. The production area of this farm became smaller.” (Farmer 17).

The key barrier here were the particular negative experiences farmers faced when becoming certified organic. Those negative experiences came in many different forms: difficulties in managing water, the extensive time commitment required to create and maintain buffer zones, as well as reduction of land available for production. Farmers believed these experiences negatively impacted them or hindered their ability to prevent cross-farm chemical contamination.

Table 4.2: Enablers and barriers related to the prevention of chemical contamination from neighbouring farms

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
Available knowledge	19	22
Barriers		
1. Difficulties in managing water	24	27
2. Extensive time commitment required to create and maintain buffer zones	16	21
3. Reduction of land available for production	15	15

Table 4.2 summarises farmers' responses in relation to the factors that promoted or hindered their ability to deal with the prevention of chemical contamination from neighbouring farms.

4.3 Soil preparation and management of organic farms

4.3.1 Background information

When farmers adopted organic farming practices, they needed to consider soil conditions prior to farming implementation. Healthy soils contain the right balance of nutrients, water, oxygen and root support that, in turn, contribute to ultimately improving crop production. According to *Organic Thailand* certification

requirements, farmers should implement measures to increase efficient nutrients used in soil fertilisers. For instance, farmers may cultivate legumes, produce green manure, and incorporate organic materials and livestock manure into the soil.

Preparing and managing soil depended on its original quality and the surrounding environment. The type of soil management required in organic farming practices varied depending on where and how the soil had been formed. For example, according to farmers, soil that used to have chemical contamination required more soil management activities compared to uncontaminated soil. Thirty farmers reported several enablers and barriers relating to maintaining soil conditions.

Figure 4.3 illustrates the farmers' responses. Eighty-four percent of the responses can be viewed as barriers. That is, most farmers chose to dwell on the negative aspects of preparing and managing soil. They are seen as conditions preventing farmers from implementing organic farming practices. However, farmers also saw a number of enablers at this stage of rice production.

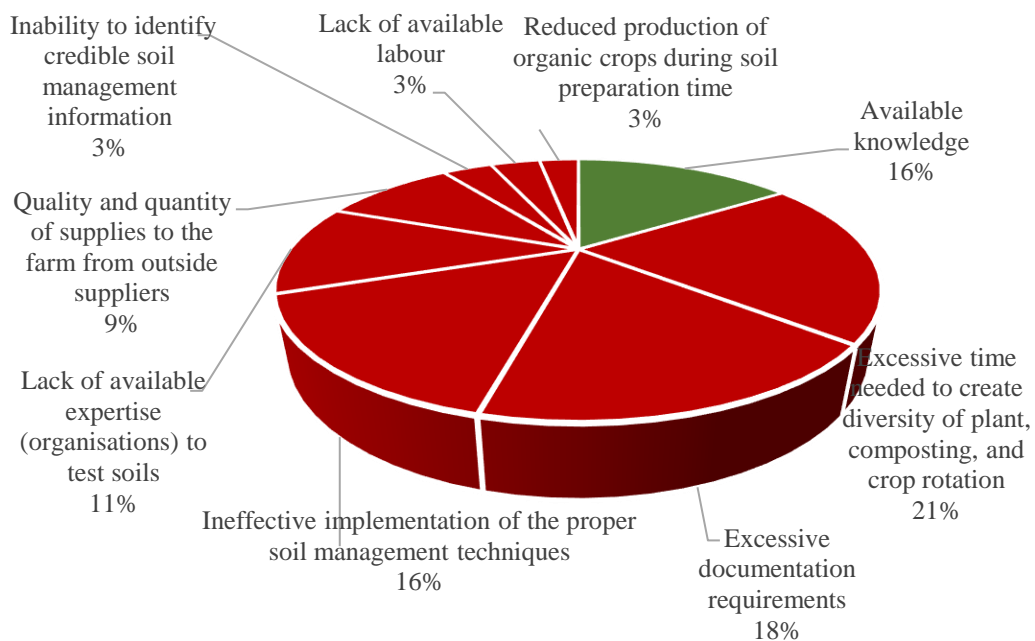


Figure 4.3: Enablers and barriers towards achieving and maintaining *Organic Thailand* certification in relation to soil preparation and management on organic farms.

4.3.2 Enablers

Available knowledge

The key enabler identified was the knowledge available to farmers to assist them with preparing and managing their soils. The knowledge came in several forms: through the internet, from family members, and from outside organisations. Farmers believed this knowledge, from these sources positively assisted them in becoming a certified organic farmer and helped them to retain that certification.

Soil preparation and management knowledge were mostly transferred from external organisations, coming from institutions like local universities and government departments. One farmer commented:

“Experts from Maejo University visited my farm and set up a composting plan for us. They also helped us build a compost pile. I felt more confident in managing the organic farm.” (Farmer 25).

The government also played an important role in increasing confidence in soil management. As another farmer mentioned:

“Government agents from the Land Development Department came to my farm and demonstrated how to produce bio extract and organic fertiliser from manure.” (Farmer 10).

Eight farmers improved soil fertility through self-study via the internet, which helped them learn about increasing the biodiversity of plants, animals, and beneficial insects. This resulted in an improved ecological system in farms. As one farmer mentioned:

“I started planting beans after harvesting rice paddy because I thought it would help recover soil quality.” (Farmer 23).

The internet was the main source of knowledge when farmers were conducting self-studies. As one farmer said:

“I always searched for organic farming knowledge. It was not difficult to find information. For example, when I bought a new tractor to adjust the soil surface, I searched on YouTube to find out how to use the tractor. Using the internet to find information was very convenient.” (Farmer 8).

Family members also contributed to the knowledge acquisition of organic farmers. Five farmers indicated that a great deal of organic farming knowledge was passed through their families’ wisdom and experience about crop rotation. As one farmer mentioned:

“After harvesting rice paddy, my husband told me to produce Sun hemp as green manure to increase nitrogen in soil and reduce soil erosion. He was an expert in dealing with soil.” (Farmer 13).

The ability of farmers to acquire knowledge through the internet, from family members, and from outside organisations was seen to be a major enabler in dealing with and managing soils.

4.3.3 Barriers

To reiterate, a *barrier* is a factor that farmers believed negatively impacted them when preparing and managing soils. Here, the researcher describes the particular negative experiences farmers faced when becoming certified organic.

To prepare and manage soils, farmers experienced several barriers: (1) excessive time needed to create diversity of plants and carry out composting and crop rotation; (2) excessive documentation requirements; (3) ineffective implementation of proper soil management techniques; (4) lack of available expertise (organisations) to test soils; (5) quality and quantity of supplies to the farm from outside suppliers; (6) inability to identify credible soil management information; (7) lack of available labour; and (8) reduced production of organic crops during soil preparation time.

Excessive time needed to create diversity of plants, composting, and crop rotation

The primary barrier for farmers when preparing and managing soils was the excessive time needed compared to conventional farming. The most obvious indicator is the annual crop yields. Almost all of the organic farmers produced only a single crop per year compared to conventional farmers who are generally able to produce two. Twenty-nine farmers spent most of their time producing compost, increasing plant diversification, and rotating crops naturally. Composting is seen by farmers as a slow process that improves soil structure in organic farms. This makes soil nutrients more accessible to crops. This process also expands the mobility of air, water, and nutrients, which increases soil nutrient levels. The composting

process is applied to replace the use of synthetic fertiliser which is prohibited in organic farming. Thus, compared to conventional farmers, organic farmers are encouraged to engage in at least one month of composting. Seventeen farmers identified the labour-intensive processes and challenges faced in spending time on the composting process. Farmers suggested composting was time-consuming because they had to control the conditions of organic manure, water quality and quantity, soil temperatures, and soil humidity. As one farmer mentioned:

“The composting process took a very long time. It took about two months because I had to wait until the soil decomposed.” (Farmer 12).

Another example was the time taken to manage the diversity of plants needed. Nine farmers identified that providing good care and properly maintaining plants was an additional work task alongside producing organic crops. Farmers were required to plan additional schedules. As another farmer mentioned:

“There were several kinds of plants on this farm including vegetables, fruits, herbs, and rice. All plants could be used as green manure for organic rice crops. I spent too much time taking care of those plants such as watering them, pulling weeds, and preventing pests.” (Farmer 13).

After farmers harvested their crops, they regularly started producing sun hemp, peas, beans, potatoes, tomatoes, or lettuces. Farmers estimated the rotation time by themselves. They were required to record the start and finish of the crop rotation. When they compared their work to the chemically assisted approach used in conventional farming, farmers mentioned it took much more time to produce

organic crops. Three farmers mentioned that they needed to take additional time to carry out crop rotation. As one farmer said:

“I needed 50-60 days to produce and plow Sun hemp. It took too much time.” (Farmer 11).

Due to extensive time commitments required in producing compost, and managing plant diversification and crop rotation, organic farmers were able to produce only a single crop per year compared to two for conventional farmers and farms.

Excessive documentation requirements

Twenty-five farmers reported a feeling of being overwhelmed with the number of documents imposed by the certifiers they needed to produce for their farms to meet the certification standards. As one farmer mentioned:

The problem was the source of organic fertiliser. When I obtained green manure from outside, I needed to provide the documents to guarantee that it came from organic sources. (Farmer 18)

Another farmer also mentioned:

I needed to identify and record the source of effective microorganisms used. It was very complicated. I needed to find the documents to support it, which was very difficult. I had to give documents to the auditors. When I carried out production on my farm, I also needed to explain and record the production of farm materials. (Farmer 17)

Another farmer also mentioned:

“Documents were one big problem. I was unable to write day to day records, update farm input information, produce production plans and produce a farm history because I did not remember the information. I did not have time to do the day to day record every day.” (Farmer 22).

The extensive paperwork and demands from Thai authorities meant there was an element of bureaucracy that put a lot of pressure on farmers to conform to certification standards. Farmers were overwhelmed with the number of documents they needed to produce to meet the certification standard requirements.

Ineffective implementation of proper soil management techniques

Another barrier for farmers when preparing and managing soils was the ineffective implementation of proper soil management techniques which would normally come from experience. Twenty-two farmers found it difficult to implement effective soil management in the composting process. As one farmer said:

“Composting was very difficult. I had to control the conditions of water, soil temperature, and humidity all by myself. It was not easy because I had never produced compost. When I started the composting process, I did not know that I needed to dig about 4m by 2m of soil to compost manure.” (Farmer 12).

As another farmer said:

The government suggested for organic farmers to produce organic fertiliser by themselves. But it was very difficult because I did not have

experience in organic farming. For example, I did not add paddy husk or rice bran to produce effective microorganisms. (Farmer 18).

As another farmer said:

Preparing organic soil was not easy. I had to reduce chemical contamination in soil and then start to fertilise soils. Thus, I tried to find a way to fertilise soil without using chemicals. I asked my friends, but no one had any experience in this. (Farmer 21).

Due to the lack of organic farming experiences, these farmers were unable to implement proper soil management techniques, even though they asked for suggestions from government agents or their friends.

Lack of available expertise (organisations) to test soils

The lack of available expertise (organisations) to test soils for their organic and inorganic properties is another important barrier. Sixteen farmers reported that there were insufficient organisational support systems to test soils. The results of soil analysis/testing were often delayed, but necessary for providing the essential information needed to apply for *Organic Thailand* certification.

As one farmer mentioned:

“It was difficult to access soil analysis support because there were not many organisations which could analyse the soil.” (Farmer 5).

All farmers mentioned they had sent samples of their soils to the Land Development Department. As one farmer mentioned:

“Over the last eight months, I took samples of soil to analyse at the Land Development Department. I have not received the results yet. I called them and they said they had many samples to analyse. I had to wait.” (Farmer 12).

Sometimes when auditors visited farms, they carried samples of soil back to be analysed. However, the results of the analyses/tests would not be sent back to farmers. As another farmer said:

“When auditors came to inspect farms, they collected the soil samples by themselves. I hoped that they might have given me the results so that I could improve soil conditions.” (Farmer 7).

This farmer makes clear the desire to know about the soil condition of their farm. Soil test reports generally provide the appropriate fertiliser application recommendations for nitrogen, phosphorus, potassium, and limestone, which affect nutrient availability to crops, and thereby yields and profitability.

Quality and quantity of supplies to the farm from outside suppliers

The quality and quantity of farm inputs such as manure and micro-organisms from outside suppliers was another challenging issue. Farmers were required to provide official documents when obtaining farm inputs from outside suppliers. Thirteen farmers reported problems when they requested documents from suppliers around certification regarding the origin of farm inputs. Suppliers were usually unable to provide certificates to guarantee that their inputs did not contain chemicals that would harm the organic status of farms. As one farmer said:

“I obtained some organic fertilisers such as animal manure from suppliers, but they were not able to provide any documents or certificates to guarantee where they were sourced from. It was a big problem when auditors asked me about the source of my farm inputs.”
(Farmer 5).

Another factor causing problems was the impact of the rainy season. Three organic farmers reported that the availability of animal manure during the rainy season was less than other growing seasons. As another farmer said:

“I was able to obtain cow manure during the dry season only. It was difficult to obtain the manure during the rainy season because producers had to make it dry before packing.” (Farmer 3).

Four farmers also reported that logistics was another barrier. Some of the suppliers to the farmers who were interviewed lived far from the farms they were servicing. As such, farmers had to travel quite a long distance to obtain the proper organic farm materials (such as cow manure and microorganisms). As one farmer said:

“I went to the place that I thought was selling organically produced manure. I went to the Omkoi district, which is located 168 km away from here. It was so far from my farm. I had to drive there by myself. I could not find a good source in this area.” (Farmer 4).

However, five farmers made recommendations to the government about the availability of farm inputs – such as setting up an organic national farming policy agenda – and pressured the government to avoid providing free chemical fertiliser to farmers. As one farmer recommended:

“I hope that the government will consider including organic farming issues into the national agenda in the future. It would help organic farmers a lot. Although, it might be very difficult because the government still provides free chemical fertiliser to farmers.” (Farmer 15).

Another farmer also recommended:

“We should have a prototype of organic farming because there were many things that we needed to learn.” (Farmer 26).

Inability to identify credible soil management information

Five farmers reported that they struggled to identify credible soil management information. After they decided to implement organic farming, they started searching for useful information relating to organic farming and *Organic Thailand* certification that was reliable enough to be used. As one farmer said:

“The problem was I did not know whether the information about sun hemp and bio extract production that I found was reliable or not. I had to read carefully and analysed the content by myself.” (Farmer 1).

Lack of available labourer

There were five farmers that mentioned several issues about the lack of available labour. Additional labour was required on farms to help manage soil. These tasks included looking after organic crops and applying organic treatments to crops. Most Thai organic farmers enter into organic farming with their families. The number of

people working per farm (either family or people hired in) was mostly between one and five. As one farmer mentioned:

“All crops were organically produced, such as pumpkin, cabbage, tomato, lemongrass, basil, chilli, watermelon, papaya, and rice. It was difficult to take care of every crop. I hired four labourers to help me because I could not look after all the crops with my husband alone.”
(Farmer 28).

Reduced production of organic crops during soil preparation time

During the soil preparation time, farmers were required to begin the stage of soil preparation especially for those who used to manage conventional farms and were converting. This preparation stage included adding organic fertilisers such as animal manure, cover crops, and green manure to enhance soil nutrient levels and improve soil structure.

Four farmers reported that the preparation of soil during the conversion phase originally took about one to six years, which was considered to be quite lengthy. As one farmer mentioned:

“During the soil preparation stage, I had low volume of yield because the soil structure still contained chemicals. For example, in the first year of soil preparation, I obtained 400kg of organic rice yield. The second year was 500kg. The third year, 600kg.” (Farmer 15).

The key negative experiences came in many different forms: (1) excessive time needed to create diversity of plants and manage composting and crop rotation; (2)

excessive documentation requirements; (3) ineffective implementation of proper soil management techniques; (4) lack of available expertise (organisations) to test soil; (5) quality and quantity of supplies to the farm from outside suppliers; (6) inability to identify credible soil management information; (7) lack of available labourers; and (8) reduced production of organic crops during soil preparation time. Farmers believed that these experiences hindered their ability to manage soils effectively.

Table 1.3: Enablers and barriers related to soil preparation and management of organic farms

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
Available knowledge	22	28
Barriers		
1. Excessive time needed to create diversity of plants and manage composting and crop rotation	29	31
2. Excessive documentation requirements	25	31
3. Ineffective implementation of proper soil management techniques	22	22
4. Lack of available expertise (organisations) to test soils	16	13
5. Quality and quantity of supplies to the farm from outside suppliers	13	6
6. Inability to identify credible soil management information	5	5
7. Lack of available labourers	5	5
8. Reduced production of organic crops during soil preparation time	4	4

Table 4.3 summarises farmers' responses in relation to the factors that promoted or stalled their ability to deal with soil preparation and management.

4.4 Pest, weed and disease prevention and management on organic farms

4.4.1 Background information

The constant rainfall and relatively high temperatures in Thailand are favourable conditions for several types of living organisms such as animals, insects, and fungi. For farmers, living organisms either benefit or inhibit crop production. Pest, weed, and disease prevention and management are mostly about the creation of a balanced ecosystem for living organisms with the intended purpose of increasing the yield of farm crops and improving farm quality. According to *Organic Thailand* certification requirements, farmers should implement appropriate pest, weed, and disease management processes to maintain healthy organic farms.

The most common issue around pest management, according to farmers, was mostly related to golden apple snail prevention. The golden apple snail is considered to be a major problem in growing rice in Thailand. Snails can damage one square meter of field overnight and completely destroy more than fifty percent of the yield. Some farmers used physical control methods such as standard traps, light traps, or the use of soundwaves to prevent golden apple snails and other living organisms such as rats, insects, and birds from damaging crops. For brown planthoppers and thrips, some farmers used another method. They produced white muscadine disease from the fungi *Beauveria bassiana*. When spores of the white muscadine disease come into contact with a pest's skin, they generate toxins and drain the body of the pest, eventually killing them (Kang & Youn, 2008).

The most common issue around weed management, according to farmers, was during the land preparation period. The most common weeds were sorrels, clovers, and crabgrasses. Weed control was a crucial issue in fields. Some farmers

implemented crop rotation and ploughing to destroy weeds and the remains of stubble from previous crops. This was usually done through manual weeding. Some farmers mentioned they did intensive physical weed pulling by themselves. Farmers specifically asked family members to help with manual pulling. As a result of this, organic farmers and their families were faced with health issues mostly relating to backaches and spine pain. Therefore, many farmers decided to hire labourers to manage the problems for them.

The most common issues around disease management, according to farmers, were occurrences of blast disease, elongation disease, and bacterial leaf blight disease. These were mainly caused by bacteria, viruses, or fungi. These diseases damaged rice and greatly reduced yield. Some farmers produced wood vinegar and fermented bio extracts from plants, animal residues, and molasses, and then applied these to the soil surface to mitigate fungal diseases and eliminate pests. The production of fungi *Trichoderma harzianum* was the most effective technique, as this was used as a plant strengthener to fight against diseases affecting mature crops.

Figure 4.4 illustrates the farmers' responses. Fifty-nine percent of the responses from farmers were barriers. That is, most farmers perceive prevention and management of pests, weeds, and diseases as a negative. However, farmers also identified a number of enablers at this stage of rice production.

4.4.2 Enablers

Available knowledge

The key identified enabler was the knowledge available to farmers to assist with pest, weed, and disease control. This knowledge came from several sources such as the internet, as well as from outside organisations.

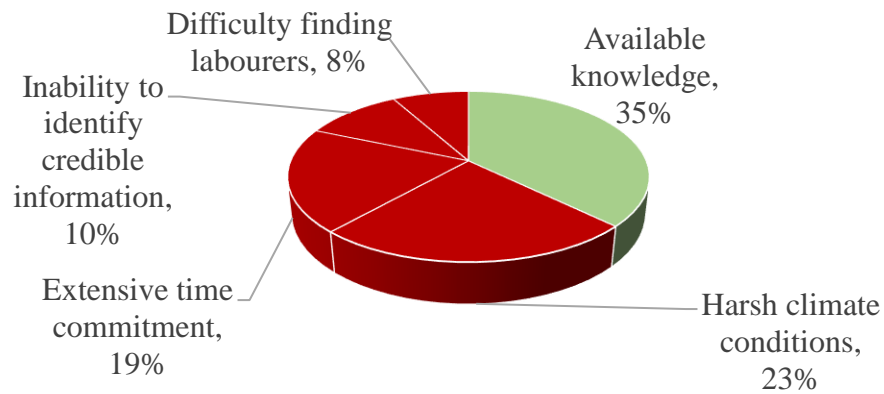


Figure 4.4: Enablers and barriers related to pest, weed, and disease prevention and management on organic farms aiming towards achieving and maintaining *Organic Thailand* certification.

Eleven farmers reported monthly government workshops on the production of *Beauveria bassiana* and *Trichoderma harzianum* as a key source of knowledge. Farmers who attended the monthly workshops would also have the opportunity to share their knowledge with other farmers. As one farmer said:

“The government agents from the Agriculture Extension department made me become the leader of the Biotechnology and biosafety information center. We set up a meeting between the government and 30 farmers. Experts came to teach farmers how to produce Beauveria bassiana and Trichoderma harzianum.” (Farmer 10).

In addition to government support, more than half of the farmers designed their own pest, weed, and disease management activities. Farmers established favourable habitats such as nesting sites and ecological buffer zones. Seventeen farmers mentioned they started looking for useful knowledge relating to organic treatments from the internet. As one farmer mentioned:

“To control unwanted birds during harvesting, they (the farmers) prevent birds and insects from damaging crops by using a net. This is due to the differences in environment, water conditions, and soil conditions.” (Farmer 14).

Farmers also integrated their ecological knowledge and personal techniques. As another farmer mentioned:

“We trapped golden apple snails by placing fresh papaya leaves in our organic rice fields for easy collection of golden apple snails.” (Farmer 2).

In other cases, eight farmers planted strong-smelling plants such as ginger, lemongrass, and chilli in waterways to spread unpleasant smells which would deter pests.

When farmers wanted additional knowledge about how to control pests, weeds, and diseases, universities were consulted as another source of information. Experts and lecturers provided useful information to farmers, and this knowledge was related to natural treatments such as biofertilisers, *Trichoderma harzianum*, and *Beauveria bassiana*. Farmers informed the researcher that the knowledge gained from experts and lecturers was beneficial and reliable. University experts and lecturers provided valuable techniques to reduce plant lice, blast disease, elongation disease, and bacterial leaf blight disease. Organic farmers were able to reduce plant lice by understanding the essence of water management. As one farmer said:

“Water management also helped to exterminate plant lice. Last year, there were many plant lice in organic rice crops. Every morning plant

lice surfaced in the water. I did not know what to do. I went to Maejo University and asked an expert from Maejo University. They said that I need to manage the water flow in the crops.” (Farmer 8).

In addition, university lecturers and local communities cooperated in sharing farming knowledge and equipment to control pests, weeds, and diseases. For example, they usually set up meetings within local areas and created a buddy system. The buddy system was conducted through farmers in villages. Young farmers aged between 30-40 years old helped older farmers in terms of the demonstration of prevention techniques. For example, they demonstrated how to produce and how to use *Trichoderma harzianum* and *Beauveria bassiana*.

The ability of farmers to acquire knowledge through the internet and from outside organisations (government departments and universities) was seen to be a major enabler in dealing with and managing pests, weeds, and diseases.

4.4.3 Barriers

Farmers experienced several barriers when preventing pests, weeds, and disease: (1) harsh climate conditions, (2) extensive time commitment, (3) inability to identify credible information, and (4) difficulty in finding labourers.

Harsh climate conditions

The warm and humid climate of Thailand tends to encourage a greater number of pest problems and contributes to excessive weed growth. Twenty-one farmers reported that they had problems in implementing pest, weed, and disease control due to the higher humidity and harsh unrelenting climate conditions that promote higher incidences of fungal diseases. Most farmers rely on techniques such as using *Trichoderma harzianum*, bio extracts, and crop rotation. As one farmer said:

“I used Trichoderma harzianum to control diseases, but the results were not 100 percent when compared to conventional farming. I still found plant lice. I stored Trichoderma harzianum for seven days before it expired.” (Farmer 15).

As another farmer said:

“It was difficult to prevent pests, diseases, and weeds without chemicals because Thailand has a tropical climate. Thus, it is very easy to find a lot of pests, diseases, and weeds in organic rice crops. And we used chemicals in farming for a very long time. It is hard to change farmers’ behaviour. If they fail in implementing organic farming, they cannot feed themselves.” (Farmer 19).

Extensive time commitment

Seventeen farmers reported that organic treatments such as *Beauveria bassiana* and *Trichoderma harzianum* took a long time to take effect on farms. As one farmer said:

“I used chemicals for a very long time. I tried to reduce the existing chemical usage by using an organic treatment such as Beauveria bassiana to prevent pests and diseases. It slowly killed pests, but did not create immediate effects.” (Farmer 20).

On some farms, the soil structure still contained chemicals during farm conversion to organic. As such, the soil would take time to absorb the organic treatment. As another farmer mentioned:

“I spent time walking around organic farms to investigate weeds by myself every night.” (Farmer 4).

Inability to identify credible information

Accurate information on organic farming standards and pest management was very crucial. Nine farmers were unable to identify credible sources of information relating to pest, weed and disease management. As one farmer said:

“I had difficulties in preventing weed problems. I searched for information and started using salt, but this was not good for soil health and nutrient composition. When we searched for information, we did not know which sources of information were useful or relevant.”
(Farmer 10).

According to farmers, while government departments had been enablers in offering solutions to problems around pest, weed, and disease management, farmers said that government advisors also seemed to take a rather pragmatic (but undesirably inorganic) approach when dealing with stubborn pests, weeds, and diseases by advising farmers to use synthetic chemicals when organic practices failed. Thus, despite good intentions, this advice was against organic philosophy and was featured as a key barrier to organic farming implementation in this research.

Difficulty finding labourers

Farmers in this research believed themselves to be healthier when compared to conventional farmers, but organic farmers are seen to perform in more intensive physical activities such as weed-pulling. Organic farming requires long hours of

physical work. Seven farmers had health issues related to their backs and spines. Most of them decided to hire more labourers. As one farmer said:

“I got rid of weeds by pulling them out by myself for 5 years. My back began to hurt. I wanted to go to see a doctor in town, but it was quite far from here. I had to drive about an hour to get to the nearest hospital. After that incident, I decided to hire about 4-5 people to pull weeds out and work on the farm. It was not easy to find labourers because most Thai people did not want to become farmers.” (Farmer 5).

Organic farmers suggested that they needed to hire an ethnic group called Tai, because Thai labourers were not willing to work on farms anymore. Most Thai labourers prefer working in factories or companies. As one farmer mentioned:

“This year I hired about four people to pull them out together with me and my husband every day until I could get rid of all of the weeds. I paid at the minimum wage rate of about 300 Baht per day. It was difficult to hire Thai people because not a lot of local Thai people want to do farming. They prefer working in factories or industries nearby this area. And this was a casual work. I needed them at specific times. I hired a local Tai ethnic group who were living in mountainous parts of Thailand.” (Farmer 1).

The key barrier here was the particular negative experiences farmers faced when becoming certified organic. These negative experiences came in many different forms: (1) harsh climate conditions, (2) extensive time commitments, (3) inability to identify credible information, and (4) difficulty in finding labourers. Farmers

believed that these experiences negatively impacted them or hindered their ability to manage pests, weeds, and diseases.

Table 4.4: Enablers and barriers related to pest, weed and disease prevention and management towards requirements

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
Available knowledge	32	43
Barriers		
1. Harsh climate conditions	21	23
2. Extensive time commitments	17	24
3. Inability to identify credible information	9	10
4. Difficulty in finding labourers	7	7

Table 4.4 summarises farmers' responses in relation to the factors that promoted or hindered their ability to deal with pest, weed, and disease prevention and management.

4.5 Organic seed sourcing and reproduction on organic farms

4.5.1 Background information

The Ministry of Agriculture and Cooperatives administers *Organic Thailand* certification in Thailand. When farmers are certified as organic, they are able to use the 'Organic Thailand' logo. The Ministry of Agriculture and Cooperatives emphasises the use of natural materials and encourages farmers to avoid using synthetic plants derived from genetic modification. As part of the certification process, farmers are required to use organically grown seeds, which are seeds that have not been treated with any synthetic chemicals. Chemically treated seeds are prohibited and must be properly removed before use. There are few natural

substances or biological seed treatments that are allowed to be applied to organic seeds. For the farmers in this research, there were three ways of sourcing organic seeds: (1) purchasing conventional rice seeds and growing them organically, (2) reproducing rice seeds in subsequent crop seasons, and/or (3) purchasing organic seeds from outside organisations such as the government or universities.

Figure 4.5 illustrates the farmers' responses. Sixty-eight percent of the responses from farmers were barriers. That is, most farmers chose to dwell on the negative aspects of organic seed sourcing and reproduction. They are seen as conditions preventing farmers from implementing organic farming practices. However, farmers also saw a number of enablers at this stage of rice production.

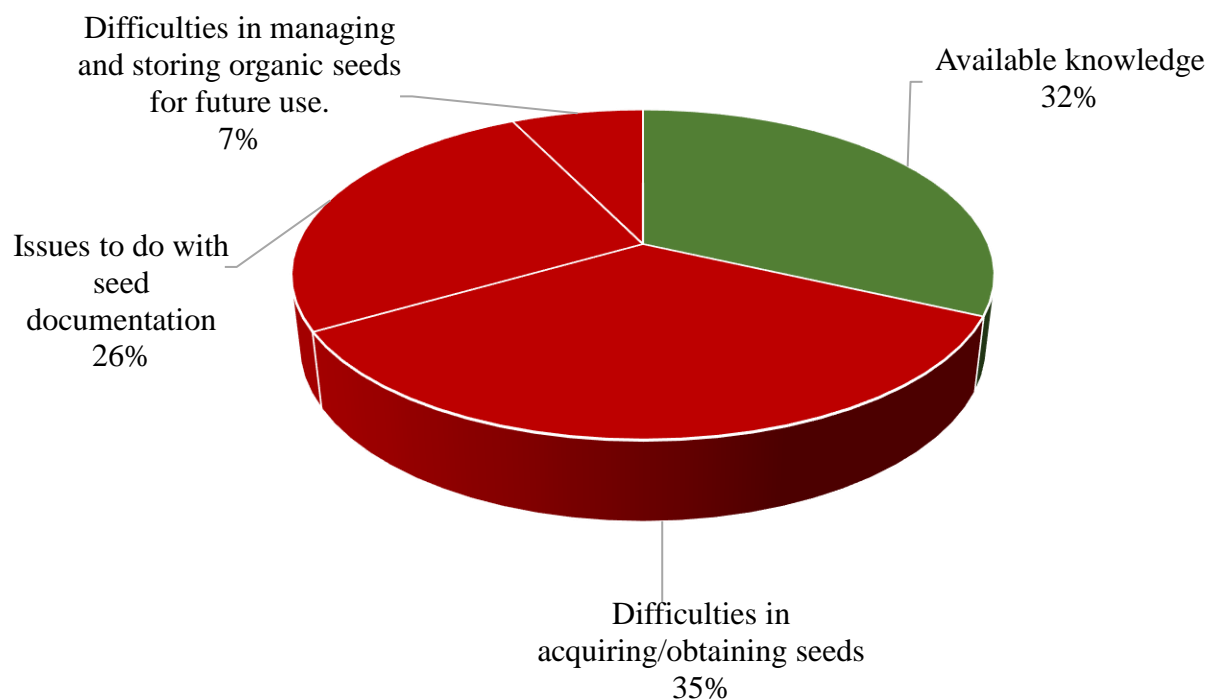


Figure 4.5: Enablers and barriers towards achieving and maintaining *Organic Thailand* certification which are related to organic seed sourcing and production.

4.5.2 Enablers

Available knowledge

The key enabler identified was the knowledge available to farmers to assist them with sourcing and/or producing organic seeds. As was experienced by farmers dealing with cross-farm contamination; soil management; and pest, weed, and disease management; the key enabler here was the knowledge available to farmers on how to produce organic seeds. The knowledge came in several forms: through the internet, from their family members, and from outside organisations (but not so much from the government in this case). Farmers believed this knowledge, from these sources, positively assisted them in becoming certified organic farmers and retaining that certification.

Eleven farmers reported acquiring knowledge from outside organisations including local organic communities and university experts. Farmers set up a team and gathered together as organic communities. Farmers in this research (from the Northern region) obtained a variety of rice seeds from another region, the Northeast region. The farmers in this research shared organic rice seeds amongst themselves and learnt from each other about the importance of recording the history of seeds.

Maejo University was the main reliable source of organic seeds. Experts and researchers from Maejo University taught farmers how to implement effective microorganisms when producing organic seeds. As one farmer said:

“I bought organic rice seeds from Maejo University once a year. Their production was professional and more reliable. All organic seeds were sorted.” (Farmer 6).

To avoid using genetically modified seeds as well as prohibited conventional synthetic pesticides, seven farmers decided to build small storages to control the quality of seeds by themselves after searching for information about seed production from the internet. As one farmer said:

“I produced organic seeds by myself. I produced seeds from previous crops. I studied how to sort and store the rice seeds from the internet.”
(Farmer 23).

Some farmers said older and more experienced family members provided available knowledge because they had experience in organic farming. As one farmer said:

“My parents grew organic rice many years before I started organic farming. They suggested to me to use our own seeds.” (Farmer 29).

The ability of farmers to acquire knowledge through the internet, from family members and from outside organisations (universities and through their own and other communities) were seen to be major enablers in dealing with producing and maintaining organic seeds. At this seed production and sourcing stage, government departments were seen to be less important than in other areas previously discussed.

4.5.3 Barriers

The principal negative experiences farmers faced when sourcing and producing seeds were identified as the following barriers: (1) difficulties in acquiring/obtaining seeds, (2) issues to do with seed documentation, and (3) difficulties in managing and storing organic seeds for future use.

Difficulties in acquiring/obtaining seeds

The barrier for farmers when sourcing or producing organic seeds was their inability to acquire/obtain organic seeds from suppliers. According to *Organic Thailand* certification requirements, farmers had to ensure high seed quality and the purity of their farms. Twenty four of thirty farmers mentioned difficulties in obtaining organic seeds, including the insufficient number of certified seed sellers within the proximity of organic farms.

A shortage of organic seeds for most crops was due to the insufficient number of certified seed sellers. Ten farmers mentioned they did not reproduce seeds by themselves and decided to obtain seeds at some point from the government or universities. Only one farmer obtained organic seeds from Maejo University due to the high price. Conventional seeds only cost one dollar per kilogram, but the price of organic seeds was thirty to fifty percent higher.

Experts had the responsibility to produce high-quality seeds taken from reliable sources. As one farmer said:

“It was difficult to find organic rice seeds. I did not know where to buy organic seeds. I called many places, but it was very difficult to contact them. I wrote letters which were signed and posted to their offices until they contacted me.” (Farmers 5).

This difficulty led to challenges in managing their growing seasons. Five farmers reported that they postponed the growing schedule due to the unpredictable ordering time. Farm location was another difficulty in accessing organic seeds. As one farmer mentioned:

“It took me an hour to go to Chiang Mai Rice Seeds Centre. It was too far from my farm. I could not drive there by myself. I usually ask my friends or my family to pick me up.” (Farmer 21).

Issues to do with seed documentation

The second barrier for farmers when producing organic seeds was their inability to find and provide credible accompanying documentation on the origin of the seeds being sourced which they would then provide to auditors who required relevant information. More than half of the farmers in this research reported this as a barrier. There was no such thing as a certified organic seed seller. Farmers in this research found it difficult to show auditors that the seeds they used on their farms were not contaminated with chemicals that were often used in conventional farming. It was impossible to obtain documents to clarify the source of seeds and the extent to which they were contaminant-free. As one farmer mentioned:

“I bought seeds from Chiang Mai Rice Seeds Centre and Lampang Rice Seeds Centre; they did not give me any documents. I just got the receipt. I was unable to clarify the source of the organic seeds by using such documents.” (Farmer 1).

Ironically, The Ministry of Agriculture and Cooperatives sometimes provided organic rice seeds to farmers, but they were also unable to provide the documents required by auditors from that same agency. Thus, farmers were not able to ensure the provenance or the quality of their organic seeds. They explained this barrier to the auditors and provided the ordering documents or receipts to the auditors instead.

After that, auditors were able to make an assessment regarding the risk of chemical contamination.

Difficulties in managing and storing organic seeds for future use.

Another barrier for farmers when sourcing and/or producing organic seeds was associated with managing and storing organic seeds for future use. Farmers reported a lack of precision in seed sorting and management during and after each season. Fourteen farmers reported that their seeding knowledge had long been passed down from generation to generation. After the organic transition period, farmers kept a proportion of seeds for themselves to ensure that seeds were never treated with chemicals. However, the mismanagement of seeds led to some farmers having to purchase new seeds from outside sources/suppliers every three to four years. Without proper processes to sort healthy seeds from unhealthy seeds, farmers were unable to reproduce crops for more than three to four seasons. Poor management and storage facilities meant some seeds were found to be unhealthy, mutated, or damaged by insects or disease, and were unable to be used for future planting. As one farmer said:

“The problem was that we reproduced organic seeds only 4 times. After that our seeds would be of low quality and have no fragrance anymore.”
(Farmer 2).

Organic seeds should only be stored at room temperature, but humidity and warmth shortened the seeds' lives which created problems for farmers. Five farmers reported that they required a lot of time to invest in seeding processes and had little knowledge of how to manage organic seeds.

It was difficult to prevent seeds from chemical contamination, condensation, and rice fungus. Farmers were required to store seeds in a dry place. As one farmer mentioned:

“Most organic seeds were derived from this farm. I sorted organic seeds by myself. It was difficult to prevent condensation and rice fungus from affecting seeds because I did not have experience with storage and packing. I just packed it in a big container. Some seeds were damaged. I was disappointed.” (Farmer 3).

Hence, the key barriers represent the negative experiences farmers faced during seed sourcing and production. These negative experiences came in many forms such as: (1) difficulties in acquiring/obtaining seeds, (2) issues to do with seed documentation, and (3) difficulties in managing and storing organic seeds for future use.

Table 4.5: Enablers and barriers related to organic seed sourcing and reproduction towards requirements

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
Available knowledge	12	14
Barriers		
1. Difficulties in acquiring/obtaining seeds	24	29
2. Issues to do with seed documentation	18	23
3. Difficulties in managing and storing organic seeds for future use.	5	5

Table 4.5 summarises farmers’ responses in relation to the factors that promoted or delayed their ability to deal with organic seed sourcing and reproduction.

4.6 Organic rice harvesting and post-harvesting

4.6.1 Background information

The reward of growing organic rice comes at the time of harvesting. Harvesting is the process of collecting mature rice crops that usually reach maturity at around three to five months after crop establishment. Rice harvesting in Thailand usually starts in October and takes up to three or four months. Harvesting involves processes that include reaping, threshing, and cleaning the rice to maximise grain yield and minimise damage to the natural environment.

Reaping represents the first step in harvesting. It is done either manually or mechanically depending on crop conditions, labourers, and machinery availability. Fourteen out of the thirty farmers in this research used manual reaping. During this stage, they cut mature rice panicles using sickles approximately fifteen to twenty centimetres above the ground. This is the most common means of rice harvesting in Thailand, but it requires considerable amounts of labour. For instance, one hectare of harvesting crops requires five to ten labourers a day. Thirteen out of the thirty farmers used a mechanical reaping method, in which they used reapers that were either hand-driven or mounted on the front of a reaper. Three out of the thirty farmers combined both manual reaping and mechanical reaping methods. Threshing is the second stage in harvesting, in which farmers would separate rice grains from the straws by hand or using a treadle thresher. Cleaning the rice grains after harvesting is the third stage and is necessary for removing unwanted materials from the grain, such as immature rice grains, unfilled rice grains, seeds from other plants, soil, rubbish, and other non-rice grain materials.

After harvesting, post-harvesting processes (drying, storing, and milling) were engaged to ensure rice grains were preserved for the market. Drying is a critical operation to reduce grain moisture content before storage. Ineffective drying operations and insufficient grain storage and farm facilities reduce grain quality and increase chemical contamination caused by weather, moisture, rodents, birds, insects, and fungi. Milling is the last process in post-harvesting rice grains. Some farmers, depending on the products created, used machines to remove husks, barn, germ, and barn layers from rice grains to reveal the final product.

Figure 4.6 illustrates the farmers' responses. Fifty-seven percent of the responses from farmers were barriers. That is, most farmers chose to dwell on the negative aspects of harvesting and post-harvesting management. They are seen as conditions preventing farmers from implementing organic farming practices. However, farmers also saw a number of enablers at this stage of rice production.

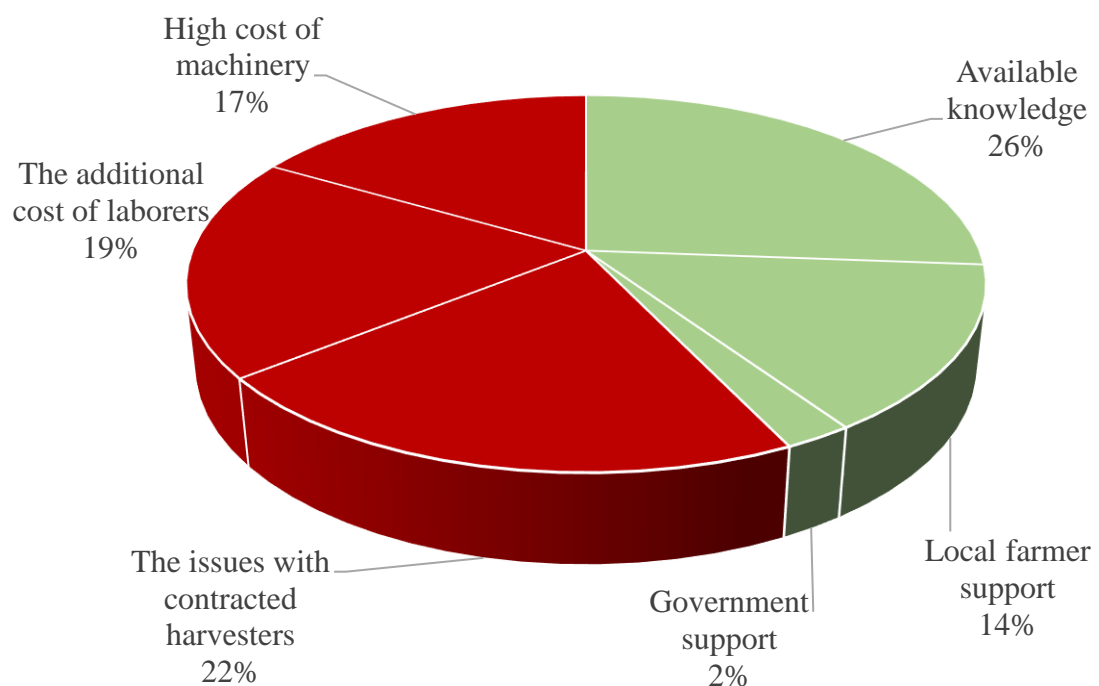


Figure 4.6: Enablers and barriers towards achieving and maintaining *Organic Thailand* certification which are related to harvesting and post-harvesting management.

4.6.2 Enablers

To manage harvesting and post-harvesting, three enablers were found to have positively assisted farmers: (1) the available knowledge through the internet and from outside organisations, (2) local farmer support, and (3) government support.

Available knowledge

According to *Organic Thailand* certification, farmers should establish appropriate harvesting and post-harvesting processes to avoid contamination and causing environmental damage. Eleven out of thirty farmers were able to engage in proper farm harvesting and post-harvesting management using prior knowledge in order to minimise grain damage and prevent grain contamination. As one farmer said:

“Every container or piece of equipment was not contaminated by chemicals because all harvesting processes were at the farm site.”

(Farmer 10).

These farmers were able to ensure that their machines and equipment were not contaminated by chemicals. Seven farmers purchased reaping machines so that they could control (limit) chemical contamination and easily explain this to auditors. As one farmer mentioned:

“I paid a lot of money to purchase reaping and milling machines. The Bank for Agriculture and Agricultural Cooperatives offered to give me a loan with low interest.” (Farmer 18).

One of the reasons why farmers in this research preferred not to hire harvesters was because of their farms’ small sizes. As one farmer mentioned:

“My farm size was not large, approximately 0.16 hectares. I hired a reaping machine from harvesters during the harvesting time.” (Farmer 29).

Local farmer support

Positive local farmer support was another important enabler. During harvesting, local farmers greatly helped each other with manual reaping and this would be later reciprocated. As one farmer mentioned:

“Other local farmers helped me with manual reaping, and after that, I helped them. There were about ten to twenty local farmers in this village. Thus, we had ten to twenty farmers helping each other. Most of them did not even run organic farms, but they were willing to help.” (Farmer 24).

Due to the high cost of reaping machines, five farmers reported difficulty in purchasing their own. As one farmer said:

“I borrowed a reaping machine from other organic farmers every year because I did not have sufficient money to buy my own reaping machine.” (Farmer 26).

Government support

One farmer mentioned that government authorities provided her with reaping machines for free because she was the main organic farmer in the village. As one farmer said:

“I got funding from the Department of Agriculture. They provided reaping machines to me for free. I did every process from planting to post-production inside this area. When auditors asked me how I did each process, I explained to them step by step.” (Farmer 5).

The key enablers here were available knowledge and outside support from other local farmers and the government. This contributed to managing harvesting and post-harvesting processes towards organic farming. Farmers believed available knowledge and outside support positively assisted them in becoming certified organic and retaining that certification.

4.6.3 Barriers

To manage harvesting and post-harvesting processes, farmers reported several barriers: (1) the issues with contracted harvesters, (2) the additional cost of labourers, and (3) the high cost of machinery.

The issues with contracted harvesters

A significant barrier for farmers when managing harvesting and post-harvesting processes was to do with harvesters (the outsourced companies contracted in by farmers to harvest rice). As one farmer mentioned:

“Harvesters seemed unwilling to take responsibility to clean reaping and milling machines.” (Farmer 13).

Farmers appeared reluctant to enforce harvesters to separate out and clean equipment which had been used on conventional farms. As another farmer mentioned:

“I was unable to ask them to clean all containers or equipment before use even though I was paying upwards of \$23 per 0.16 hectare. It was not expensive, but organic rice was contaminated by chemicals from conventional farms.” (Farmer 8).

The additional cost of labourers

The second barrier for farmers was the additional cost of labourers. According to farmers, hiring labourers was more beneficial than hiring harvesters because they were able to control chemical contamination, especially for farmers who proceeded with manual reaping, threshing, and milling.

Eight farmers reported that they hired more labourers during harvesting and post-harvesting and paid additional costs. As one farmer said:

“I hired four more labourers to help me during harvesting processes. I paid wages. This was the reason why I sold organic products to the market at a higher price.” (Farmer 3).

As another farmer said:

“Every container and piece of equipment in the harvesting and post-harvesting process was not allowed to be contaminated by chemicals.

Thus, I decided to harvest by myself. I hired more labourers to help me during harvesting. I paid wages to these five labourers. It was an additional cost.” (Farmer 17).

High cost of machinery

Seven farmers reported the high cost of machinery such as reaping machines, threshing machines, and milling machines as a significant barrier. As one farmer mentioned:

“I had limited funds. Thus, I could not afford a reaping machine without filing for a loan.” (Farmer 12).

The identified barrier here was the particular negative experiences farmers faced when becoming certified organic. These negative experiences came in different forms including the barriers with contracted harvesters, the additional cost of labourers, and the high cost of machinery.

Table 4.6: Enablers and barriers related to harvesting and post-harvesting management

Enablers/Barriers	No. of interviews [30]	Frequency of occurrence
Enablers		
1. Available knowledge	11	14
2. Local farmer support	6	7
3. Government support	1	1
Barriers		
1. The issues with contracted harvesters	9	10
2. The additional cost of labourers	8	9
3. High cost of machinery	7	8

Table 4.6 summarises farmers' responses in relation to the factors that promoted or hindered their ability to deal with harvesting and post-harvesting management.

4.7 Chapter conclusion

This chapter presented enablers and barriers in achieving a certified organic farm and maintaining 'Organic Thailand' certification under the certification processes.

A number of enablers that positively assisted farmers were (1) easy accessibility of knowledge about organic rice farming via the internet, knowledge-holders – family members or local communities; (2) farmers' motivations and self-interests in their own and their families well-being; and (3) institutional support provided by the government and local university workshops on cross-chemical contamination prevention, soil preparation, pest prevention, weed prevention, disease prevention, and (post-)harvesting management. These enablers promoted farmers' ability to deal with the certification processes more effectively.

A number of barriers were also identified which farmers believed negatively impacted the workload. Farmers reported that excessive time was needed for soil preparation, pest prevention, buffer zone maintenance, diversity of plant management, composting, and crop rotation. Furthermore, farmers showed negative experiences whilst finding evidence and preparing documentation. There was also insufficient organisational and available expertise and support to test soils and an insufficient number of certified seed suppliers. During and after each harvesting season, farmers reported a lack of precision in seed sorting and management. Other barriers were related to a lack of suppliers with animal manure and their inability to provide certificates to guarantee that manure did not contain chemicals harming the organic status of farms. Additional difficulties were associated with water

management including issues related to both water pollution and water scarcity. Most farmers did not know neither how to prevent pollution nor were aware of their water situation. Lack of available labourers and the additional cost of hiring labourers were also barriers. In addition, the warm and humid climate of Thailand tends to encourage a greater amount of pest problems and contributes to excessive weed growth. Negative experiences with contracted harvesters was another barrier. Farmers appeared reluctant to enforce harvesters to separate out and clean equipment which had been used on conventional farms. Additionally, the cost of reaping machines, threshing machines, and milling machines was perceived as too high. Farmers reported a reduction of land for rice production due to the land allocation as a buffer zone and the delay in the recognition of produce as organic due to the stringent standard's requirements. Lack of experience was another barrier in implementing proper soil management techniques. Farmers had problems when producing green manure and organic fertiliser and were unable to obtain high crop production. Farmers struggled to seek out and identify credible soil management information, especially when they searched for information on the internet. Accurate information on organic farming requirements was very crucial. These barriers hindered farmers' ability to deal with the certification processes.

The identified enablers and barriers provide an explanation of what farmers encountered and experienced when achieving and maintaining *Organic Thailand* certification. In the next chapter, the discussion, conclusions, limitations, and future research possibilities will be discussed

Chapter Five

A Process Framework

5.0 Introduction

This chapter provides the details of a theoretical framework that provides the general principles for organic farming. A process framework in this research includes every set of actors and processes in Thai Organic Rice Farming. This process framework would be the reference model that provides insights into the causality of particular adopted farming practices. Figure 5.1. presents a theoretical framework named the Thai Organic Rice Farming (TORF) framework that outlines interactions between identified actors and processes that linked the actors.

5.1 Framework

Thai Organic Rice Farming practice framework consists of four actors: (1) Farmers, (2) the *Organic Thailand* Standard, (3) Resources and skills, (4) the management system and documentation, and (5) Organic farming practices and certification as the outcome. This chapter will discuss the role of the primary actor in Thai organic farming practices and the four key processes, which are linked among key actors.

5.2 Key actors in organic farming practices

5.2.1 Farmers (*primary actor*)

Farmers were the primary actors in the implementation of the process. It is the farmer's attitude and motives that influence the success of the standard's implementation the most. There are different types of farmers' motivations identified in literature prior to the start of the adoption of organic farming practices.

Thai farmers concerned about their health and their family's well-being more than obtaining profit while many grain farmers in the U.S. were more likely to be motivated by profit maximisation, environmental stewardship, and health concerns (Peterson, Barkley, Chacón-Cascante, & Kastens, 2012).

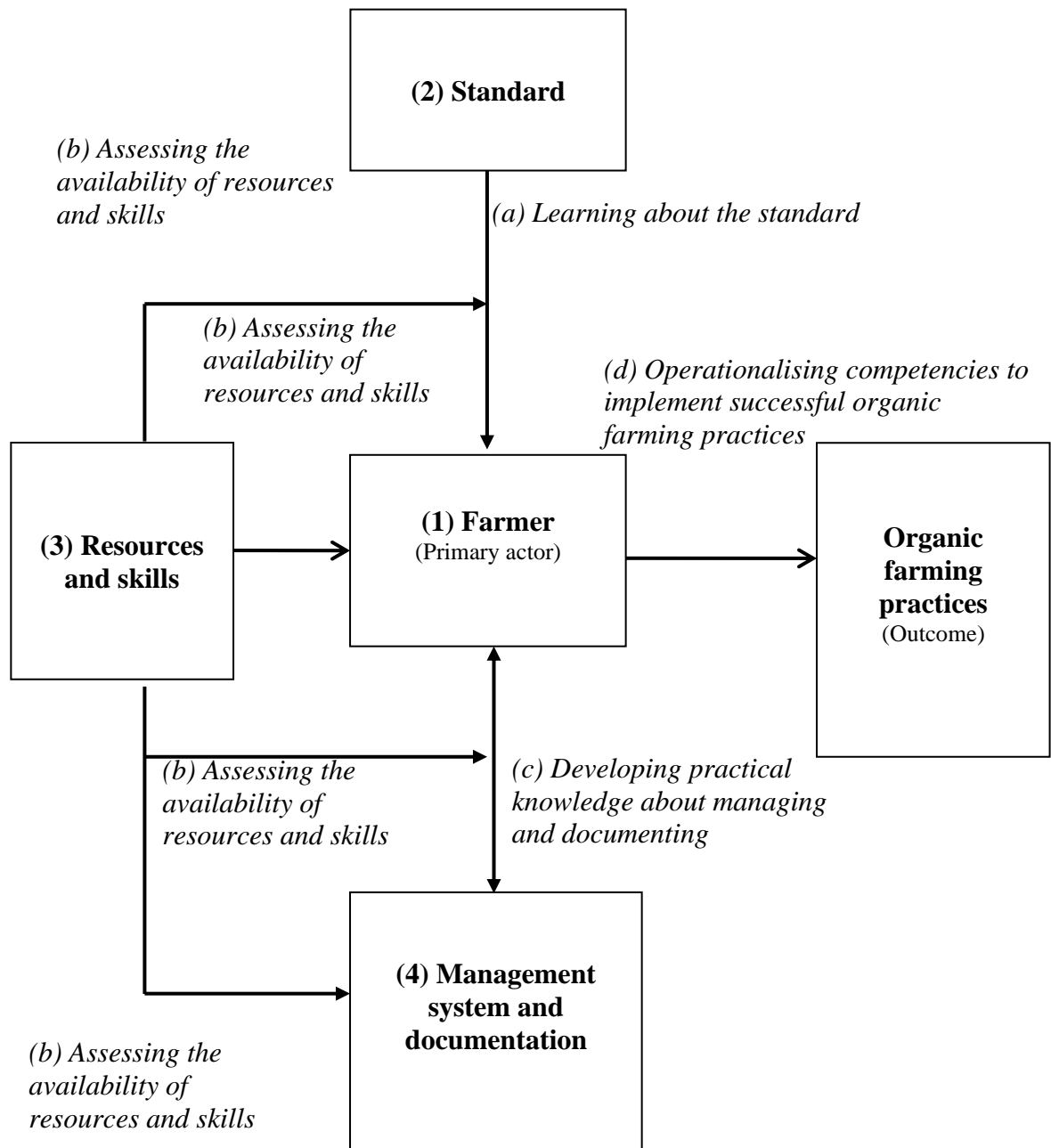


Figure 2: Thai Organic Rice Farming (TORF)

5.2.2 Organic Thailand Standard (actor)

The standard acts in ways to influence what farmers can and can't do. The main objective of this standard is to provide guidance on what one needs to do in order to get certified. Through organic certification standards, Thai farmers gained competitive advantages from being in an organic sector and strengthened domestic market opportunities. Most Thai organic rice farmers sold their products to a domestic market. Thai people did not see the difference between local and international certification. Hence, Thai farmers decided to apply for the *Organic Thailand* standard. However, there was no guarantee that products were free of all environmental pollution residues or chemical contaminants. A similar outcome was captured in the US market where farmers struggled to secure a guarantee from distributors, marketing companies, packers and shippers, and warehouses and brokers. They would conform to organically grown product regulations regarding prohibited substances, yet their products would still be combined with conventionally grown products (Dimitri & Oberholtzer, 2009).

Thai farmers were unable to gain the organic price premium, as farmers needed to sell their crops at the conventional farming price while transitioning towards the certification. A similar outcome also occurred with US commodities which included the study of organic Maize, Soybean, and Wheat products in New York, USA. Cox et al. (2018) identified the absence of an organic price premium during the transition period as U.S. farmers were not eligible for the organic price premium because the products are not yet certified by the certifier. Greek organic farming had a similar issue about labelling, where unlabelled organic products were sold to the market as conventional products even though organic farms were considered as a well-

developed farming sector in Greece (Argyropoulos, Tsiafouli, Sgardelis, & Pantis, 2013). It confirmed that due to the delay in the recognition period of the products, Thai farmers have challenging issue that related to the organic price premium.

5.2.3 Resources and skills (actor)

Thai farmers require sufficient and supportive skills and resources from their family members, and external organisations such as the government, local universities and local communities. Beneficial resources for implementing organic practices include (1) farm input suppliers, (2) labour resources, (3) land, and (4) soil analysis experts.

The first resource in implementing organic farming practices is the suppliers of farm inputs. In Thai organic farming systems, the majority of nutrients are supplied from organic matter such as compost, manure, and cover crops in order to maintain soil productivity, supply plants with nutrients, and control insects, weeds, and other pests. Suppliers were the major barrier to organic farming because they were unable to provide a certification to guarantee that their products did not contain chemicals that could harm the organic status of farms. It is consensus with one research in India. Most Indian farmers preferred producing their own farm inputs (Srinivasan & Dinesh, 2018)

The second resource in implementing organic farming practices is labourers. Thai organic farming uses large amounts of labour relative to the land area, which means that there is a high use of labour per unit of land area. This problem also occurred in the Cameron Highlands, Malaysia, where Malaysian organic farmers employed a large number of foreign workers from neighbouring South East Asian and South Asian countries who understood organic cultivation, causing labour-intensive

farming (D'Silva, Samah, Shaffril, & Man, 2011). Intensive farming is dependent on the huge labour power in organic cotton production in China due to the rapid urbanisation across the nation, and more rural labourers migrated to big cities and towns to work in secondary and tertiary industries. This issue was similar to Thai farms, where only weak labourers such as the elderly, women and children were the main labourers engaged in agriculture. Along the Yellow River and Yangtze River Valley, harvesting was done manually using sickles and knives, although some other practices like soil tillage, soil preparation, and plant protection were done with machinery. Although such intensive farming technologies support sustainable cotton production, there were increasing barriers from labour shortage (Dai & Dong, 2014). It confirmed that labourers were one of the main resources involved in organic farming.

The third resource in implementing organic farming practices is land resources. Farmers initially faced intense requirements which concerned the prevention of chemicals in certified organic production and non-organic land. The lack of clarity of the buffer zone standards leads to distance requirements for buffer zones. In Thailand, most organic farms are surrounded by conventional farms, which means the majority of organic farmers are required to dedicate a specific farming area to prevent chemical contamination. The buffer zone was the main cause of the reduction of production areas, leading to it being the main factor causing the problem of farmers having limited land for the production of organic goods.

The fourth resource in implementing organic farming practices is financial resources. Thai farmers had limited financial resources. Full ownership of cultivation land was uncommon, and primarily rented from landlords, and loans

from banks were used for Agriculture and by Agricultural Cooperatives to buy tools and equipment. Most Thai farmers could not afford the high cost of agricultural machinery, for example reaping machines, threshing machines, and milling machines. Machinery cost was a barrier in the implementation of organic farming for other countries with different environmental and economic conditions (Sopegno, Calvo, Berruto, Busato, & Bocthis, 2016).

Financial support from governmental and transformational learning due to participatory planning among farmers and related actors led to the effective production of in Vietnam (Ha, 2014). While in the United States, the government creates most of its support for organic farmers by educating consumers about the benefits of organic products, conducting research, forming support networks, and promoting locally grown organic farms. In addition, Chile's organic implementation and development focused on farmer satisfaction. When Chilean farmers perceived the advantages of organic farming, they tended to increase the acceptance of certification compliance (Padilla Bravo et al., 2012).

The last resource in implementing organic farming practices is soil analysis organisation and expertise. This type of resource requires support from external organisations, including the government and local universities.

In developed countries, governments at different levels play important roles in the legitimisation and institutionalisation of organic agriculture. For instance, in the cases of Dar es Salaam, Tanzania; and Copenhagen, Denmark, local and central governments promoted sustainable urban organic agriculture by facilitating policy development and the conservation and allocation of land. Governmental support for urban agriculture in the cities of Copenhagen and Dar es Salaam can encourage

long-term sustainability (Halloran & Magid, 2013). Based on the production of organic goods in Brazil, organic agricultural public policies from the Brazilian government continue to concern agribusiness and sustainable agriculture and have contributed to the institutional strengthening of organic agriculture (Candiotto, 2018).

In addition, in southern China, there was cooperation between the government and farmers at the county, township and village levels. They formalised and institutionalised financial and technical support, mediated between farmers and enterprises, and attracted investors to broaden organic market channels (Qiao, Martin, He, Zhen, & Pan, 2018).

Skills refer to farmers' abilities of expertise to implement organic farming. The two most significant skills in Thai organic farming practices are (1) time management and (2) farm operation.

The first skill in implementing organic farming practices is time management. Thai farmers participating in the interviews identified that a large amount of time was consumed dealing with additional processes such as soil preparation, pest prevention, buffer zone maintenance, the diversity of plants, composting, and crop rotation. They showed concern and raised issues about time consumption and the need for assistance. van Bruggen, Gamliel, and Finckh (2016) had similar outcomes when comparing organic farming to conventional farming. It confirmed that organic farming systems generally have higher plant diversity, which requires more rotation and cover cropping, leading to increased time consumption. Close collaboration

with various stakeholders is in need of revision to reduce time consumption in organic farming.

The second skill in implementing organic farming practices is farming operation skills. Farming operation skills start from the seeding process, going through soil preparation and harvesting, and eventually continuing into post-harvesting responsibilities. Lack of experience and skills in organic farming management directly reduced the volume of crop production. Farmers learned to control pests biologically, manage soil nutrient levels, and produce different crops during the process of transitioning from conventional to organic farming.

In Mediterranean agricultural practices, the use of synthetic fertiliser also led to increasing interest in water management (Aguilera, Lassaletta, Sanz-Cobena, Garnier, & Vallejo, 2013). Water pollution and managing the limited sources of water were also difficulties for Thai farmers in their own operations. Farmers struggled to prevent water pollution and water contamination as well, as they had a lack of awareness regarding water contamination from nearby factory wastes and synthetic fertiliser usage in conventional farming. Most organic farms were surrounded by conventional farms and there was a lack of water management support from external organisations to deal with this. In contrast, in the Slovak Republic, after Slovakia joined the European Union, farmers were able to use financial support from the EU in the Rural Development Programme to improve the quality of groundwater and surface water for the period of 2007–2013 (Paľšová, Schwarczová, Schwarcz, & Bandlerová, 2014).

Weed management was another issue hindering farmers' ability to manage organic farm operations. Almost all farmers in Thailand reported using crop rotation, and cover cropping as weed control. This issue was similar to one in the northwest United States where weed management practice was a challenging issue for farmers (Tautges, Goldberger, & Burke, 2016). A survey of certified organic farmers was conducted in five states in the northwest United States. The results identified that farmers have a lack of information regarding weed control. Farmers utilised more-diverse weed management with varying diversity in weed control practices on most of the organic farms. Operating a more-diverse weed management program should be introduced and educated to Thai farmers, who have a lack of information and experience when operating weed management systems for organic crops.

The limitation of organic seed supply is another challenging problem when obtaining organic certification because organic seeds are not as tolerant to diseases and pests, as they are produced without any fertilisers and pesticides. Farmers purchase new seeds or multiply the seeds by themselves every three to four years as there are no seed companies who are able to provide guarantee documents that state the organic certification of the seeds. While Thai farmers are struggling with the seeding process, the study of Poland organic farms showed the opposite outcomes. Polish seed companies have responded by setting up the country's own organic seed production for the delivery to its domestic market. In the years 2008-2014, organic seeds in Poland were produced by four seed companies. They produced organic seeds of varieties such as pea, carrot, cucumber, broccoli, pumpkin, onion, leek, and spinach (Szpakowska & Hol Ubowicz, 2015). Thus, Polish organic farmers were able to obtain various organic seeds compared to Thai organic farmers. Shariff,

Sajjan, Babalad, Nagaraj, and Palankar (2017) conducted a field experiment on the Green gram, an extensively grown leguminous crop grown in India. They confirmed that the main problem in organic seed production was the unavailability of organic seeds for further reproduction.

Large operation farms provided retailers with large volumes of production, which have more leverage in the marketplace. Thai farmers operated small volumes of production; they were suffering from lack of access to the price premium while transitioning towards certification. Federal crop subsidies would help the risk farmers enduring lower prices during the initial transition period operation. After farmers had received the organic certification, some farmers were concerned about consolidation in the food retail industry. Supermarket chains possess less interest in selling locally grown food, therefore, farmers are forced to collaborate to set up a local marketplace.

According to Thai farmers, the outcome of operating organic farms was a reduction in crop yields when compared to a conventional farm. A debatable issue about the organic yield gap, which significantly differed between organic and conventional farming, is mentioned in several studies. An analysis of 362 published studies revealed that organic yield is approximately eighty percent of conventional yield. This was focused exclusively on the productivity in developed countries. The rationale behind this was due to challenges in the management of soil nutrients, water, and the prevention of pests and diseases. (De Ponti et al., 2012). The availability of organic products, therefore, is insufficient for human consumption needs due to the low volume of production (Aune, 2012).

5.2.4 Management system and documentation (actor)

Intensive management systems reduce natural enemies to vegetation such as pests and diseases, and they assist in positively supporting the ecosystem. Some Thai farmers struggle to manage effective soil preparation and prevent pests, weed and diseases, as chemical fertilisers were known to be strictly prohibited. They had a lack of experience in implementing proper soil management techniques such as producing green manure and organic fertilisers.

Based on a survey of farmers' practices in Cameroon, each farmer has a unique soil management technique for evaluating the qualitative fertility status of soils. Tillage and mulching are the main soil management techniques. However, in order to obtain a better soil insight into Cameroon farming systems, some complementary techniques had been notably conducted, such as evaluating the effects of different type of soil fertility management on crop yields. Some farmers implemented on-farm experiments to compare the effectiveness of each farm input, and soil fertility management practices on their crop yields (Kome, Enang, & Yerima, 2018). Zeng et al. (2011) studied soil quality in organic and conventional management of tomato yield quality. In the conventional system, pesticide treatments and chemical fertilisers were applied when needed and were adopted. In the organic system, a three-year crop rotation including soil tillage was implemented and carried out. The tomato leaves, stems, and roots showed a significant increase in both fresh and dry weight of biomass in organic management when compared with conventional farms.

With the documentation process, in France, farmers recorded and wrote down work procedures as a matter of farm routine (Joly, 2010). All certified organic farmers complete document keeping as a compulsory requirement of organic certification to

present the development of their farm operation and make organic practices legible and transparent. It is in consensus with Thai and Indian farmers, many of the organic farmers expressed a broad complaint about responsibility associated with finding evidence and preparing documentation.

A similar issue was mentioned in Uttarakhand, India. Since the 2000s, in the northern Indian state of Uttarakhand, the state government has supported certified organic agriculture. Indian organic farmers failed to record how they produced and treated seeds, cleaned agricultural tools, sourced livestock feed, and measured quantities of farm inputs. Documentation only recently became a routine element of their work (Seshia Galvin, 2018).

5.3 Key implementation processes in organic farming practices

Key implementation processes link all key actors together when implementing organic farming practices. Each interaction contributes to or prevents successful organic farming practices. Each Thai organic farm is implemented differently depending on the competency in learning standards, or availability of resources and skills, or availability of management systems and documentation. The effectiveness of the implementation process is the consequence of Thai organic rice farming practices. Four key implementation processes were identified as followed: (1) Learning about the standard, (2) Resource and skill availability, (3) Learning of management systems and documentation, and (4) Operation and experience in organic farming practices.

5.3.1 Learning about the standard (process)

To begin organic farming practices, most farmers started learning to comply with the standard requirements provided by the organic certification body. Learning of the *Organic Thailand* standard is presented as a process (a) in the framework. A sample of production and processing activities were described in the standard handbook and was obtained as general guidance for farmers. Most farmers prepared documentation on their own with limited help and support from their families. Farmers studied the requirements through browsing recommended websites on the internet, family members' existing knowledge, and external organisations' interventions. They then adapted their obtained knowledge to the management system and prepared documentation. The relevant documentation that had to be submitted included land ownership documents, pictures of the farm, farm input details and the history of the farm. Farmers are sceptical of government bureaucracies and did whatever they could to avoid any confrontation and therefore acted out of their own self-interest by being disciplined and careful about the processes by coming up with the appropriate documentation.

Every year farmers wanting to re-apply for the standard had to be aware of the changes in the requirements and procedures. Standards frequently changed in terms of forms, procedures, and requirements almost yearly. Farmers in Latin America were ensured that the organic certification standard was reliable. When auditors inspected organic farms, farmers believed that the reliability of the inspection was not guaranteed (Albersmeier, Schulze, Jahn, & Spiller, 2009). Farmers had both positive and negative experiences from the auditors during the inspection period. Some auditors were not intimidating and contributed positively towards the

certification process by trying to understand farmers' points of view. However, in some cases auditors lacked expertise and hands-on experience in organic farming practices and were unable to provide credible suggestions to farmers about how to produce animal manure.

5.3.2 Assessing the availability of resources and skills (process)

Another key implementation process in organic farming practices, presented as process (b) in the framework, is assessing the availability of resources and skills to achieve the organic certification requirements. There are three main resources and skills: (1) expertise from supporting organizations, (2) operational skills, and (3) financial availability.

Labour organisations are not mentioned in Thai organic farming, as Thai farmers obtained a high level of farming knowledge from their experiences, training or self-study, but when considering the supporting organisations, external organisations are major enablers in dealing with and managing pests, weeds and diseases. Labour organisations had primarily helped small farmers to overcome the lack of a permanent hired workforce in France (Navarrete, Dupré, & Lamine, 2015). In France, to generate a more sustainable system in organic vegetable farming, labour organisations were established within communities.

Some Thai farmers claimed that misunderstandings of organic principals had an effect when advice was given to farmers. This was strongly affected by the lack of communication between farmers and the government. Some government advisors took a problematic and inorganic approach when dealing with stubborn pests, weeds, and diseases by advising farmers to use synthetic chemicals when organic

practices failed. The Thai government struggled to perform government functions in organising and establishing an organic philosophy. The government had an uncertain role in agenda-setting and was unable to maintain its roles when policies were in a stage of implementation. Communication between the Thai government and farmers is mentioned as another challenging issue.

In contrast to the situation in Thailand, the Czech Republic has established long term organic farming organisations and policies. The organic farming organisational development and organic farming policy network were established to maintain the competence in organic farming policies and create a high reputation of the organic farming network, which is centralised around the Ministry of Agriculture and actors from state administration (Moschitz, Hrabalova, & Stolze, 2016). The suggestion from farmers is to set up an organic national farming policy agenda and pressure the government to avoid providing free chemical fertiliser to farmers as a supportive public authority for developing and helping to broaden inter-organisational networks (Fraussen, 2014).

When farmers transferred to organic farms, farmers had to configure the intensive labour farming methods. The availability and understanding of family members were extremely essential to buffer organic implementation and link the family members' perceptions (Lamine, 2011). In the Austrian study, family members expressed their interests and talents to organic farming through diversifying on-farm activities. Austrian farmers focused on their families' values from generation to generation. Farm income contributed enormously to family income even with problems in selling their products directly to the customers through direct marketing strategies (Strauss, 2015). Thus, apart from external organisations, family members

who possessed prolonged or intense experiences through farming practices and education in farm management highly contributed to exceptional organic farming knowledge, distinguished for their wisdom and judgment of farming practices.

Due to a lack of organic farming experiences, these farmers are unable to implement proper soil management techniques even when asking for suggestions from government agents or from their associates. For example, the availability of experts was limited specifically to the process of analysing soil. There is a limited number of organisations for soil analysis in Thailand, and it can take as long as 6 months to get analysis results, which is a significant amount of potential production time being consumed.

Farming operational skills carried out by farmers have been described primarily as organic farming production, management, and harvesting of organic products. The operational skills of organic farming practices are the key success factors to a farm's ability to be successful. The three key factors, which helped contribute to successful farming operational skills include (1) managing farm input suppliers, (2) labourers, and (3) contracted harvesters.

When farmers operated organic farms they tended to have developed fertiliser self-sufficiently by using self-produced compost and fertilisation from auxiliary plant legumes (Tzouvelekas, Pantzios, & Fotopoulos, 2001). The problem was a limited number of manure supplies both in terms of quality and quantity, and suppliers were unable to provide certificates to guarantee that their suppliers did not contain chemicals that would harm the organic status of farms. A high cost of specialised

equipment, organic seeds, and substitute synthetic chemicals was another reason for the insufficient number of certified seeds sellers.

Organic farming depended primarily upon a large number of labourers. The organic farming operation itself required long hours of work on a farm site, and organic farming production is usually associated with higher employee hours (Dimitri & Oberholtzer, 2009). Some Thai farmers were faced with health issues relating especially to their backs and spines. With the comparison of labour proficiency, having hired labour on organic farms was more efficient than running family-operated organic farms as found in the production (Kongsom & Panyakul, 2016). Thus, most farmers decided to hire labourers during soil preparation; pest, weed, and disease management; and harvesting time. For instance, one hectare of harvesting crops required five to ten labourers a day. Likewise, proficient activities were combined with greater management of mechanical tillage, planting, covering, harvesting and handling crops which effected wages and the cost of hiring labourers (Guthman, 2014).

The final operation of organic farming was harvesting and post-harvesting management. Most farmers in this research used prior available knowledge to minimise grain damage and prevent grain contamination. The availability of contracted harvesters' issue occurred as a result of the inability to enforce harvesters to separate and clean equipment, which had been used on conventional farms. This led to an inability to hire properly contracted harvesters, especially for farms that were smaller in size. This was because contracted harvesters usually only agreed to work on farms that were more than two acres in size. Another problem was that the rice grain on each farm did not reach the maturity stage at the same time. Thus, most

farmers had to manually harvest to avoid hiring contracted harvesters. Farmers believed other neighbouring farmers and the government department in charge positively assisted them when managing harvesting and post-harvesting processes. Therefore, during harvesting, local farmers greatly help each other with manual reaping and later reciprocated. In addition, there should be a constructive support from Thai government or Thai government should provide reaping machines for free to farmers.

Financial availability is the farmers' assets and liabilities over the production time. The cost of reaping machines, threshing machines, and milling machines comes with a high financial burden (Sopegno et al., 2016). Due to the high cost of reaping machines, farmers were faced with the difficulty of purchasing their own reaping machines to ensure that their machines and equipment were not contaminated by chemicals. Farmers struggled to obtain the necessary finances for purchasing farming equipment such as reaping machines, threshing machines, and milling machines. Some farmers decided to hire contracted harvesters, or outsourced companies to harvest crops. Thai farmers agreed that an additional cost of hiring labourers and specialised equipment was a financial limitation that hindered farmers to implement organic farming practices. The Bank for Agriculture and Agricultural Cooperatives should offer financial services, in particular short- and long-term loans directly to individual farmers. The objective of these low-interest loans is to help farmers to meet production costs during a given production season. This includes the cost of land preparation, seeds, fertilisers and labour hiring. The repayment period of the loan's ranges from twelve months to twenty years.

5.3.3 Developing practical knowledge about managing and documenting (process)

Developing practical knowledge about managing and documenting is presented as process (c) in the framework. Farmers' insights helped us to understand the lack of experience in farming, in terms of proper soil, pest, weed and disease management practices. For example, Thai farmers had a lack of guidance and were unable to produce effective green manure and organic fertilisers. They did not know how to produce organic treatment properly.

Since most organic farms are family-operated farms, farmers required the expenditure of time on farm-related work and had to balance this time spent with household tasks such as laundry and care of clothing; provision of meals; tidying of houses; and the care of elderly and children. The case study in southwestern France had dissimilar results. Farmers concurrently engaging in conversion involving organic farming were confident in their ability to adapt to professional farming technology and cope with changes by using professional learning processes. The Learning process of farmers was the exchange of experience and collective learning through daily observations, evaluations, and the investigation of farms. They believed organic farming gave them an option to sustain their family farms (Bouttes, Darnhofer, & Martin, 2019). In Ghana, organic pineapple farming had the same issue. Organic pineapple farms had longer production cycles compared to conventional farms, generally being twelve to eighteen months from planting to harvest, depending on the water and fertilising regime. Most Ghana organic farms were smallholders which were similar to Thai organic farms. Both groups of farmers

used very little organic fertiliser, and weeding was mostly done by hand and was why organic farming was identically time-consuming (Kleemann, 2011).

Thai farmers had an undesirable experience during the process of finding evidence, needing to record daily farm inputs and filing documents due to knowledge availability. Acquiring or modifying existing new knowledge, therefore, was the learning process for farmers. The proper guidance on how to manage soil, weeds, pests, and diseases by following clear instructions and examples from the government department, certifiers, or local universities was required to explore the farm management system and documentation. In addition, more research is needed on the long-term farm management consequences of organic practices (Willer & Lernoud, 2017).

5.3.4 Operationalising competencies to implement successful organic farming practices (process)

Operationalising competencies to implement successful organic farming practices is presented as process (b) in the framework. The main challenges of organic farming practice were farmers' experience and the knowledge-intensive requirements production (Jouzi et al., 2017). The entrepreneurial development of organic farming remains weak in Thailand. Lack of farm development programs and activities led to improper implementation plans and practices that especially the disrupted management of water, seeding processes, and soil preparation.

The first issue was operationalising competencies to water management. Limited water supply has become an enormous constraint, especially in the 21st century in developing countries. In Asia, water resource management was a challenging issue

as 60 percent to 90 percent of water was used for agriculture. The number of Asian farms has been shrinking with the reduction of yield, due to limited water supplies and water pollution (Godfray et al., 2010). Water was one of the key organic principals discussed in organic certification regulations across the world. Australian and Mexican regulations emphasised specific details in water management, for example, farmers were required to monitor water conservation and not excessively deplete water resources to avoid impacting flora and fauna (Seufert et al., 2017). Nutrient stress and limited water availability reduced organic yield more than conventional yield (De Ponti et al., 2012). Uncontaminated water and natural fertiliser result in organic farming practices bringing benefits to the environment (Willer & Lernoud, 2017). It confirmed that to attain true organic farming, water availability and water pollution are some of the many challenges needed to be dealt with.

Another management issue is the difficulties in managing organic seeds for future use. Certified organic seeds, commonly recognised as clean seeds or disease-free seeds, were produced by specialised producers. When farmers obtained certified seeds from specialised producers, seed quality was formally regulated by public institutions through an organic certification programme. Some specialised potato seed producers who produced certified seeds were also certified to maintain satisfactory genetic purity and the identity of the seed as well (Thomas-Sharma et al., 2016). Impacts of this integrated seed production management oversaw the reduction in yield and would otherwise prolong seed health over successive cycles of vegetative propagation. Organic seed production is highly developed for long-term use on organic cotton farms in India, China, Turkey, Kyrgyzstan, and the

United States. Non-genetically modified seeds are suitable for organic conditions and ensure that all organic cotton farmers are able to cultivate good quality seeds (Willer & Lernoud, 2017).

Another challenging issue is the farmers' experience in soil management. Farmers did not feel that they could identify the causes of deficiencies in soil nutrients and methods to implement a solution to salvage the problem. This was due to the lack of knowledge and experience regarding biological soil processes, as some farmers had used chemicals and pesticides as the regular application method for resolving problems involving soil or the build-up of organic matter in the soil. The understanding of innovation in organic farming became an interesting perspective in Europe as this could contribute to sustainable development and increase better exploitation of soil management knowledge. UK farmers were also not fully aware of the knowledge extension of soils including very low diversity of swards and grazes in an extended rotation. Austrian farmers, in addition, were not aware of diagnosing manure problems and crop rotation (Delate, Cambardella, Chase, & Turnbull, 2017). Difficulties with soil management involving organic production systems resulted in a low yield production system compared to conventional systems.

Research regarding water management, seeding, and soil preparation should be considered as a significant solution to develop programs or activities to increase organic farm productivity (Jouzi et al., 2017). The Thai government should provide helpful and constructive support to local farmers. The concentration of knowledge was a similar problem to organic pineapple farming in Ghana. Ghana farmers showed efforts to build confidence in better organic farming practices when there

was sufficient equipment support from the government, and helpful support from other local farmers (Kleemann, 2011).

Consequently, the outcome of all processes is successful organic farming practices and certification. Several studies mentioned that organic farming practices are involved with organic standards, farmers, resources and skills, management systems and documentation (Aguilera et al., 2013; Halloran & Magid, 2013; Qiao, Martin, He, et al., 2018). Thai organic farming practices started similarly with an understanding of the standards, the availability of resources and skills, the effective management system, and documentation. However, In Florida, U.S. Seufert et al. (2017) discussed that the interest in organic products of consumers completely influenced the organic requirements such as the absence of harmful substances.

Organic products could be economically competitive with conventional products depending on the extent of organic product demand, and these organic products are required to contribute to sustainability and environmental practices. Consumers purchased organic products because it ensured that they would be healthier (De Ponti et al., 2012). This actor, therefore, is defined as a result of the Thai organic rice farming framework. Feeding the world with organic farming practices might require high performance from each actor in the organic farming framework.

5.4 Practical Implications

This research acts as a guide to assist future farmers in obtaining organic certification by detailing effective organic farming processes and provides the implications for Thai farmers, the Thai government, universities, and communities.

5.4.1 Implications for farmers

Following a consistent understanding of Thai organic farming practices in the previous section, some of the research presented significant implications for Thai farmers. Here, the researcher suggests some significant skills for Thai farmers. The first significant skill is *adaptability*. Adaptability refers to farmers' ability to overcome obstacles by adopting new farming techniques. Thai farmers should develop their knowledge from learning about the practises of other farmers and adapting their own practises. For instance, instead of growing water plants such as water ferns, water mimosa, and lotuses to dispose of chemical contamination, one farmer decided to build water valves in all of their reservoirs, and thus, this farmer was able to control water flow from local water streams to the reservoirs. This was one of the farming techniques used to prevent water pollution that other Thai farmers could adopt.

Creativity is another significant skill that Thai farmers should develop. If Thai farmers are able to create and develop valuable farming techniques and innovations by themselves, they will be able to operate successful organic farming practices. For instance, some creative methods for pest prevention were the use of large white plastic bags to disturb bird or insect vision, and the growing of strong-smelling plants such as lemongrass and ginger nearby organic crops to deter pests. Farmers should exercise their creativity, which means they should be creative with their solutions to problems faced on their farms.

For Thai organic farming practices, especially when implementing organic certification, a strong sense of *time management or organisational skill* is required. The management of organic farms requires different time allocations to that of

conventional farms. Thai farmers must organise their time, not only for the production of crops as routine work, but also for the preparation of documentation, the preparation of soil, the inspection processes, the creation and maintenance of buffer zones, the prevention of pests, and the management of transition periods. All additional processes must be prioritised and planned with clear goals and measurements, but few farmers spend enough time planning farm operations before applying for certification. For instance, according to the organic certification standard, farmers are required to record evidence of farm inputs, their farm history, farm production maps, and farm production plans, which can take more than three months to complete all of the required documents. The length of the documentation process can be reduced if farmers are able to allocate time efficiently and have a good sample of documents or templates. Raynolds (2004) also identified that farmers had to be able to organise their time with the increasing number of requirements. Besides, farmers had to be very conscious of the frequent changes in forms, procedures, and requirements.

Thai farmers should *share experiences* among themselves. In line with Velikova and Arabska (2015) who suggested that certified organic farmers should create an elite group among farmers who manage conventional and organic farms to share their experiences. This cooperation between farmers as a group will benefit all farmers. A buddy system is also another cooperative arrangement in which farmers pair up and share knowledge relating to farming techniques. The collaboration of organic farming networks in each local area could produce several advantages for farmers. For example, reducing the need for hiring contracted harvesters, and assisting in knowledge transfer and labourer transfer during harvesting seasons. If

farmers develop needs and problems together, it is an opportunity for all of them to determine better organic farming practices.

The managerial implications of the TORF framework can be seen in daily decisions and setting farm management strategies by focusing on the delegation of personnel, farming techniques and resources, including farm inputs and equipment. Important factors that can improve organic farming in Thailand are embedded in learning about the organic certification standards and processes. Thai farmers should have a proper production plan that contains objectives for farm units, set budgets and production targets, and keep records of crops and financial records. Since Thai farmers had an undesirable experience during the process of finding evidence, where they needed to record daily farm inputs and file documents, with knowledge availability, a production plan may look at farm inputs and outputs and measure the extent to which each farm objective is achieved. Furthermore, Thai farmers should ensure the provision of appropriate and adequate training opportunities and facilities to meet the requirements of organic certification.

5.4.2 Implications for government

The Thai government is the certifier of the *Organic Thailand* certification and creates policies to support it. Some potential support systems and implications are discussed in detail.

The first suggestion is that the Thai government should *create clear templates, instructions, or samples* of the required documents for Thai farmers such as farm history, farm production plan, and farming processes. After the Thai government creates the templates, the government should distribute them to Thai farmers and explain the instructions on how to fill out each form.

The Thai government should relay *up-to-date information to Thai farmers* and make sure that all of them are able to access recent information relating to changes of requirements. Sometimes Thai farmers are not aware of the required changes. For instance, the Thai government frequently changes regulations as to the width of the buffer zone, the list of acceptable treatments, and the various forms of documentation, and in these cases some farmers must reconstruct their buffer zones or rewrite documents. The researcher recommends for the government to set up contact points such as organic call centres to keep farmers up to date with changes to requirements. Frequent changes to documents, processes, and requirements are major obstacles for farmers in several countries such as Chile, Brazil, Germany, and Costa Rica (Albersmeier et al., 2009; Padilla Bravo et al., 2012; Schulze & Spiller, 2010).

In addition, The Thai government should *create more geographically dispersed certified organic farm prototypes*. There are limited good examples of organic farming practices or prototype farms in Thailand. Thai farmers have difficulty in visiting existing prototype farms because some are located in remote areas or in other cities, and therefore, Thai farmers should create more geographically dispersed farm prototypes. For instance, the Thai government should create farm prototypes in each village, and this policy could be called *one village one organic farm prototype*.

The Thai government should *provide a process for certifying organic farm inputs to Thai farmers*. To do this, they would need more knowledge on how to produce farm inputs. Action plans on how to produce and certify farm inputs are required along with the action plan for the organic certification. This is due to the lack of

knowledge about farm input production and the difficulty of obtaining farm inputs, as most farmers have insufficiencies in this area.

The *Land Development* department is the only government department that provides soil testing services. In an effort to ensure the quality of soil, some farmers were required to send their soil samples to the Land Development Department. The findings in this research indicated an unnecessarily prolonged soil testing process, and thus, the government should structure the soil testing system by establishing additional soil testing services. The Thai government should *offer quicker processes for testing and certifying soils* by establishing soil analysis centres and official contacts in each village. This would offer a way to increase the speed of the testing processes for Thai farmers, because they would not need to send their soil examples to other provinces or the capital city.

Furthermore, the Thai government should *incentivise organic farming*. The Thai government should continue providing free organic certification to encourage more Thai farmers to start implementing organic certification. Also, The Thai government should facilitate training courses for Thai farmers on how to manage soils, pests, diseases, and weeds in organic farms, monthly, or as frequently as possible. However, instead of offering synthetic fertiliser to Thai farmers, The Thai government should provide free organic fertiliser instead.

In addition to proactive support, the Thai government should *educate Thai farmers on the benefits of organic farming*. Thai farmers have limited knowledge about the benefits of organic farming; they start implementing organic farms mainly because of their self-interests. Educating Thai farmers about the benefits of organic farming in wider aspects such as sustaining ecosystems, creating biodiversity, and promoting

a good quality of life would increase the commitment of Thai farmers who want to implement organic farming.

Public awareness could be an efficient way to create acceptance towards organic products. The Thai government should *promote the benefits of organic farming and produce to prospective workers (labourers) and consumers*. The Thai government should try to increase the number of organic farm labourers, especially among Thai people, by comparing the benefits of working on farms to those of working in factories. In addition, The Thai government should promote the quality of organic products to consumers. This would need a good road map and collaboration with other relevant organisations such as universities and communities.

The Thai government would also need to create promotional activity campaigns such as organic trade fairs, organic events, farm visiting, as well as open farm days dedicated to organic produce at the national level. This would help to boost organic market share and increase organic production and consumption, and it is the obligation of the government to create a boost in this area. This research reveals the role of the government as a certifier and policymaker that may influence the ideas of organic farming which finally leads to setting up regulations that legally define organic practices and rules.

5.4.3 Implications for universities and communities

Local universities and local communities would be viewed as the facilitators of potential knowledge and learning activities of organic farming practices. Universities should *do more research on the benefits of organic farming at various stages along value and supply chains*. Research related to organic farming practices

is considered as a necessary activity that should be actively promoted to investigate new farming techniques and the production of ideas (Jouzi et al., 2017). Apart from research relating to farm management, universities should research more on how distributors and retailers can effectively distribute organic products to consumers. Results of the research would create appropriate advice for Thai farmers and other stakeholders in organic farming.

Universities should *provide workshops based on farmers' needs*. Universities should start with researching on what farmers want to know and start doing in-depth studies. Following that, universities can set up workshops to demonstrate practical skills and organic practices to Thai farmers and assist them step by step so that they are able to adapt their knowledge when they implement them on their own farms. Thai farmers can shape how organic farms can be demonstrated in practice by utilising their knowledge provided by research from local university experts and researchers through workshops and demonstrations.

Communities should *increase awareness of organic farm production* by creating campaigns to build healthy communities and promote environmental sustainability. The increased dedication of Thai communities would help to assist the long-term growth of Thai organic farming.

5.4.4 Implication for other agribusiness sectors

Organic farming is one of the fastest-growing sectors of global agriculture (Schulze & Spiller, 2010). The TORF framework assists not only organic rice crops but helps identify the key actors and processes that may be incorporated into other agribusiness sectors such as poultry farming and aquaculture. For examples, the TORF framework could provide additional information on how to manage farm

inputs, machinery, and documentations more efficiently for producers who intend to verify that the organic product comes from a production process which is in compliance with applicable organic standards.

Lastly, the TORF framework could provide additional knowledge to agricultural policy makers in other countries, bring additional clarity to agriculturally related plans and decisions, and further develop advice and policy planning related to organic farming in particular. The collaboration of farmers and other relevant stakeholders must continue once farmers start implementing organic farming practices to improve farmers' skills and help them manage farm resources. However, the TORF framework should be further verified and correspondingly improved in other countries.

5.5 Limitations and further research

Although this research contributes to our knowledge of organic farming practices and *Organic Thailand* certification, it has limitations that need to be acknowledged. Limitations relate to: (a) the generalisability of findings, (b) the sampling of participants and contexts, and (c) the un-tested TORF model.

This research examined organic rice production in Northern Thailand. As such, the conditions farmers faced may be particular to their regions. Farmers hoping to seek certification in other parts of Thailand should consider the variations and complexities that may come with the government officials and processes in those regions. The TORF model may help identify key considerations, actors, and likely processes to be faced, but the intricate details will be contextual; that is, they may vary given their locations. Of course, researchers in countries other than Thailand working on organic certification will likewise need to consider the nuances of their

own jurisdictions. The respondents in this research were all certified organic farmers, that is, they had already negotiated the processes of seeking, obtaining, and maintaining certification. As such, key theoretical insights which formed the foundation for the TORF framework rely exclusively on farmers' insights. Hence, external organisations, including certifiers, suppliers, government agencies, and local communities are not accounted for in the development of the framework. Such an examination of the TORF framework by including other key external organisation insights would increase the framework robustness. Finally, the TORF framework requires testing with different data collection and analysis research methods. Testing the framework would help further the development of organic farming practices and organic certification.

Furthermore, the findings of this research have proposed a set of enablers and barriers, thereby generating the TORF framework through farmers' perspectives. Further research could assess the causality of each of the identified nodes in the framework of this research to add external organisation perspectives in order to discover more relevant factors.

Organic rice farming in Thailand shows great potential as it is a major commodity in Thailand. Research of more comparable commodities such as tea, cabbage, coffee, tomatoes, bananas, and pineapples in more specific aspects, such as a sample of farms from different farm settings at the regional and global system level, should be carried out to reveal undiscovered factors that help or hinder the implementation of organic farming practices. Of course, it is possible that the research of other commodities may point out different enablers and barriers in their own specific settings.

Chapter Six

Conclusion

In this research, Thai organic rice farmers were aware of organic farming practices in terms of the opportunities and challenges they faced. These farmers had significant experience in traditional farming ranging from one to ten years before transforming into an organic way of farming. The decision to change from a conventional to a sustainable organic farming system was due to factors which included health-consciousness, environmental concerns, and social concerns on the part of farmers. For instance, farmers operating a conventional system experienced personal and family health problems when synthetic pesticides were used, and the gradual depletion of soils occurred as soil nutrient levels were not maintained properly due to excessive and intensive chemical usage together with inadequate soil management. From this challenge came the opportunity to implement organic farming practises.

To have their organic farms officially designated as organic, farmers decided to apply for organic certification and complied strictly with the requirements involved. Farmers were required to implement additional organic farming operations such as crop rotation, use of green manure, biological pest and disease prevention, and water quality enhancement. It was essential to understand farmers' awareness of the enablers and/or barriers that contributed to and/or hindered their abilities to implement organic farming practices because these can be useful for future organic farming practices and government regulations.

This research examined the perceptions of certified organic farmers towards the *Organic Thailand* certification. The farmers' concern for their own wellbeing, society, and the environment made farmers more passionate about organic farming and increased their diligence in discovering how to implement good organic farming practices according to organic farming requirements. Furthermore, evidence from this research indicates that farmers obtained valuable knowledge from their family members and friends who carried out organic farming practices. Some farmers mentioned that training workshops to implement good organic farming practices were beneficial to obtain certification. For instance, some farmers learnt how to produce wood vinegar by attending training workshops at local universities. This research has highlighted interesting practices which may benefit future organic farmers.

Some farmers, in contrast, had experienced several restraining barriers. Farm location was one of them. Most organic farms in Thailand are surrounded by a large number of conventional farms which utilise synthetic chemical fertilisers, pesticides, and herbicides. As an additional reason, some farmers converted their farms from conventional to organic, thus, their farms still had chemical contamination residue. They were required to apply for a transition period that usually took from one to three years before they were able to achieve the certification. Apart from the spreading of chemical contamination from conventional farms, farmers also faced a problem with heavy toxic water pollution being dispersed from factories, as well as harmful agricultural chemical disposal from conventional farm production. All production activities such as manufacturing factories, conventional farm production, and organic farm production used similar

water sources and waterways. Some farmers recommended that government authorities should work together with the community to solve this problem. An example of desirable action was when farmers tried to prevent water contamination by building reservoirs or artificial ponds on their farm sites and grew water plants such as lotuses or aquatic ferns in the reservoirs. This research reveals the innovative farming techniques farmers took to overcome the serious issues they faced.

Apart from restraining barriers, and the strategies they used, farmers had enormous difficulty in managing organic farms according to organic certification processes. One of the most difficult issues was the excessive time it took to manage soil and produce natural fertilisers. When synthetic fertilisers were not permitted on organic farms, farmers were forced to carry out crop rotation practices by growing different types of crops such as beans, peas, and sun hemp. Crop rotation helped to reduce soil erosion and increase soil fertility, however, during almost fifty days of crop rotation, farmers were not able to grow their main crops. The excessive time needed when preparing documentation was another difficulty when applying for organic certification. There was a large amount of documentation required to submit to the certifiers such as farm history, details of farm inputs, production plans, and sources of organic seeds. Farmers believed organic farming required too much time in implementing the required processes compared to those involved with conventional farms. Another example of difficulty that negatively impacted farmers' ability to achieve and maintain organic farming was insufficient organic related support systems, such as insufficient expert support in testing soils, an insufficient number of certified seed suppliers, a lack of precision in seed sorting and management, and a lack of animal manure availability. Knowledge transfer from external

organisations such as government departments and local universities was the alternative solution for farmers to learn how to improve their farm management systems. This research also reveals the advice and encouragement from government departments and local universities on how to manage soils, seeds, farm inputs, and documentation.

In this research, the identified enablers and barriers are explained through a model. All the identified interacting enablers and barriers had an impact, to a certain degree, on farmers' implementation towards organic farming practices. This research established a novel conceptual framework called Thai Organic Rice Farming (TORF). TORF is a comprehensive model of organic farming which describes a number of interconnected processes which lead to the outcome of successful organic farming practises and certification. The purpose of TORF is to provide a model for supporting farmers and farming families to implement and sustain good organic production. In the TORF model, farmers are the primary actor in organic farming. Farmers adapted their management practices over time as they learned about other good practises, learned how to operate their own farms, and increased their experience through creating novel techniques for soil fertilisation, and weed and pest management. The restriction of certain farm operations and the learning of organic standards encouraged organic farmers to come up with a range of alternative solutions, such as using bio-extracts instead of synthetic fertilisers. The availability of certain resources and skills is equally important to enhance farm operation performance and increase yields.

Knowledge of the TORF framework is useful in contributing ideas to improve and further develop improved and more knowledgeable farming practices. This

framework should benefit future and present organic farming farmers who seek to obtain and maintain organic certification. The contribution that this research has made is an initial step in understanding the essence of organic farming and organic certification, the preliminary idea of how organic certification should be dealt with, and how various actors responded to the practice. The model developed may contribute to future research relating to how organic farming may evolve. I am absolutely certain this research provides a basic for more meaningful rather than trivial models to come.

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Appendix A: Information Sheet



Kotchaporn Pongcharoen, PhD Candidate
College of Business and Law
Department of Management, Marketing & Entrepreneurship
University of Canterbury
Email: kotchaporn.pongcharoen@pg.canterbury.ac.nz

Organic certification in Thailand: An examination of the barriers and enablers farmers face.

Information Sheet for [*Organic farmers*]

My name is Kotchaporn Pongcharoen, a PhD candidate from University of Canterbury, New Zealand, the aim of this research is to identify the enablers and barriers that farmers encounters when seeking and maintaining organic certification.

There is an increased interest in the production and consumption of organic certification in Thailand. To ensure that organic consumers buy organic products, farmers must be certified and complied organic standards by an accredited organisation. There is lack understanding of the enablers and barriers towards organic certification. An understanding of how enablers and barriers is perceived by organic farmers is another crucial aspect that should not be overlooked. This study will scrutinise these barriers and enablers to create an enhanced understanding of how farmers can overcome the barriers when implementing organic certification. The study will focus on contributing the knowledge in terms of the factors that are affecting farmers including certifying activities and crop production requirements, which are the major aspects affecting the decisions of farmers when considering an implementation of organic certification. Such understanding will allow farmers and certification bodies to understand the reality of organic certification nature, thus, creating a more effective approach to adopting organic certification.

If you choose to take part in this study, your involvement in this project will be as followed:

As you come forward to volunteer the researcher would phone you to explain the research background, purpose, your involvement, information and consent forms and the interview process. The information sheet and consent form would be sent onto you via

email. The researcher and you will then arrange a suitable time and location to meet for the first interview. No individual commitment is required at this stage.

At the interview stage, prior to starting the interview the researcher will explain in detail: the interview process, consent, confidentiality and anonymity, security of information and the options to withdraw from the research project. Following this you will then be given the opportunity to ask questions, then on completion of discussion you will be invited to sign the consent form. You will be interviewed in a closed one-to-one environment, which will last 60 minutes. This research will be conducted in a responsible and appropriate manner to conform to rules and regulations of the University's Ethical standard. Appropriate methods of data collection will also be used to ensure that results from this research are gathered in a desired manner.

You will be informed and notified about the purpose of this research to prevent any misunderstanding that might occur during the research process. You will only be contacted at your available times and will be interfered undesirably. Permission from you will be enquired prior to the data collection and interview process. The information gathered will be kept confidential and when disposed, the waste material will be treated as confidential wastes. Your interview will be audio recorded. A digital dicta-phone will be used for the voice recording of the researcher and you. During the interview you will be informed when the recording starts and when it stops. The researcher will make hand written notes during the interview.

As a follow-up to this investigation, you will be informed through the information sheet that interviews will be recorded and that you will have the opportunity to read through the anonymised transcript. All interview audio recordings will be sent to a transcription company (Centre for Evaluation and Monitoring at the University of Canterbury) to be transcribed into hardcopy format for further review by the researcher. You will be given the opportunity to be provided with a hard copy of the interview transcripts if requested to review before they are used for analysis.

Participation is voluntary and you have the right to withdraw at any stage without penalty. You may ask for your raw data to be returned to you or destroyed at any point. If you withdraw, I will remove information relating to you. However, once analysis of raw data starts on August 1st, 2016; it will become increasingly difficult to remove the influence of your data on the results.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. To ensure anonymity and confidentiality, you will be given assurances that data collected will be handled confidentiality, with anonymity and stored securely. You will be allocated an anonymous code following the completion of the consent form; these codes will be used in transcription, analysis, presentation and publication of the findings. The researcher and members of the supervisory team members will be the only individuals with access to information that could identify individuals involved in the research process. This data will be stored in a password-protected file, on the secure university server accessed via a password protected log in. Any hard copies of consent forms will be stored in a lockable unit in a card-accessed room at the university. Views, expressions and quotations provided by you will be respected and written in English in a fair and well balanced way. All raw data and audio transcripts will be stored on computer resources under an encrypted password in protected files

secured on the University of Canterbury server. No computer resource data will be placed on the Cloud. Until digital recordings are transcribed the dicta-phones will be stored at a locked unit inside a card access room at the university. Once material has been transcribed and placed on the computer it will be removed from the dicta-phone. The digitally scanned signed consent forms and additional anonymised data will be stored in separate password protected files. Original signed consent forms will be stored in a locked unit in a card accessible secure university building. These resources will be disposed of at the completion of the study using the secure disposal facilities provided by the University of Canterbury. All hardcopy materials and computer resources will be locked in a secure facility at the University of Canterbury and then destroyed after ten years. A thesis is a public document and will be available through the UCLibrary.

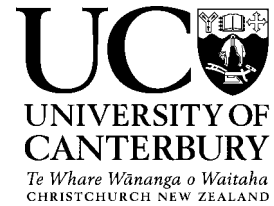
Please indicate to the researcher on the consent form if you would like to receive a copy of the summary of results of the project.

The project is being carried out as a requirement for a partial fulfillment of a Doctoral Philosophy Degree in Management by Kotchaporn Pongcharoen under the supervision of Associate Professor Michaela Balzarova, who can be contacted at Michaela.balzarova@canterbury.ac.nz. She will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, you are asked to complete the consent form and return to the following e-mail address: kpo30@uclive.ac.nz

Appendix B: Consent Form



Kotchaporn Pongcharoen, Phd Candidate
College of Business and Law
Department of Management, Marketing & Entrepreneurship
University of Canterbury
Email: kotchaporn.pongcharoen@pg.canterbury.ac.nz

Organic certification in Thailand: An examination of the barriers and enablers farmers face.

Consent Form for [Organic Farmers]

Include a statement regarding each of the following:

I have been given a full explanation of this project and have had the opportunity to ask questions.

I understand what is required of me if I agree to take part in the research.

I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.

I understand that any information or opinions I provide will be kept confidential to the researcher and that any published or reported results will not identify the participants. I understand that a thesis is a public document and will be available through the UC Library.

I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after ten years.

I understand the risks associated with taking part and how they will be managed.

I understand that I can contact the researcher, Kotchaporn Pongcharoen, email: kpo30@uclive.ac.nz or supervisor Associate Professor Michaela Balzarova, email: Michaela.balzarova@canterbury.ac.nz for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)

I would like a summary of the results of the project.

By signing below, I agree to participate in this research project.

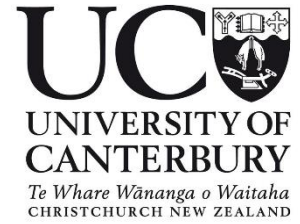
Name _____

Signed: _____ Date: _____

Email address (for report of findings, if applicable):

Please complete and return the consent form to the following e-mail address:
kpo30@uclive.ac.nz

Appendix C: Permission Letter



Dear Sir/Madam
February 2017

1st

Application to Conduct a Research Study

My name is Kotchaporn Pongcharoen and I am a PhD student from the University of Canterbury, New Zealand. I am currently conducting research entitled “Organic certification in Thailand: An examination of the barriers and enablers farmers face.” and I am writing to invite you to request the participation of you to participate in my study as part of the PhD requirement.

This study focuses on the certification of organic farming in Thailand. The aim of this research is to identify the uncovered enablers and barriers to achieving and maintaining organic certification, and the interactions among those enablers and barriers. I believe that your experience and insight into organic farming practices could be a great contribution to the understanding of the certification of organic farming in Thailand.

The semi-structure interview will take approximately 45-60 minutes. This interview will be recorded for transcribing and kept confidential. I will ensure that your personal identifies will be treated confidentially during the analysis and are not revealed in the finding of the study, a PhD thesis, and published reports. You can request to review the transcript to approve the content by sending an email to me at kotchaporn.pongcharoen@pg.canterbury.ac.nz or call +64 0277772117 for any questions.

Thank you for your consideration to participate in this study. Your participation is greatly appreciated.

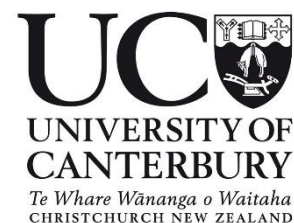
Best regards,

Kotchaporn Pongcharoen, Phd Candidate
College of Business and Law
Department of Management, Marketing & Entrepreneurship
University of Canterbury
Mobile: New Zealand: +64 0277772117
Email: kotchaporn.pongcharoen@pg.canterbury.ac.nz

University of Canterbury, New Zealand University of Canterbury Private Bag 4800,
Christchurch 8140, New Zealand. www.canterbury.ac.nz

Appendix D: Interview Guide

Kotchaporn Pongcharoen, PhD Candidate
College of Business and Law
Department of Management, Marketing & Entrepreneurship
University of Canterbury
Mobile: New Zealand: +64 0277772117
Email: kpo30@uclive.ac.nz



The possible introduction statements

I want to thank you for taking the time to meet with me today. My name is Kotchaporn Pongcharoen. I would like to talk to you about your experiences participating in organic certification in order to capture the enablers and barriers in organic certification.

The interview should take less than an hour. I will be recording for transcribing because I do not want to miss any of your comments. Please be sure to speak up so that I do not miss your comments. During the interview, I will be taking some notes. During the interview, you do not have to talk about anything you do not want to. You may end the interview at any time.

Your personal identifies and responses will be treated confidentially. This means that the transcription will be only shared with my supervisors.

The list of possible questions to ask a farmer about the enablers and barriers to achieving and maintaining organic certification and the interactions among those enablers and barriers.

Topic: Organic certification requirements	
1. Conversion period	
Q 1	How long did the transition period take?
Q 2	Why did it take that long (more than 12 months)/short (less than 12 months)? If it took <u>more than 12 months</u> , what was/were problems you have encountered during conversion period?
Q 3	How was/were the problem(s) solved?
2. Prevention of cross-contamination	
Q 4	How do you prevent organic farm from chemical contamination?
Q 5	What was/were problem(s) you have encountered before or during building buffer zone?
Q 7	Why did a buffer zone cause you the problem?
Q 8	How was/were the problem(s) solved?
Q 9	How do you manage water on farm individually? or with the community?
3. Soil management	
Q 10	What do you do to improve soil fertilisation on-farm? And how hard is it to maintain soil fertilisation on-farm?
Q 11	What type of organic manure do you use?
Q 12	Where do you buy organic manure material?

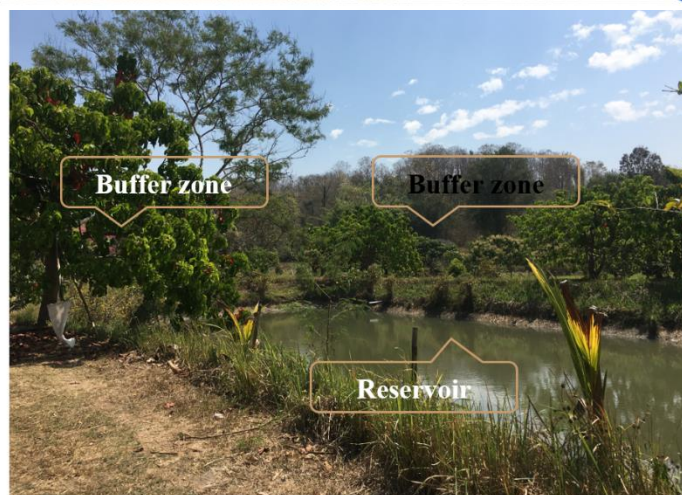
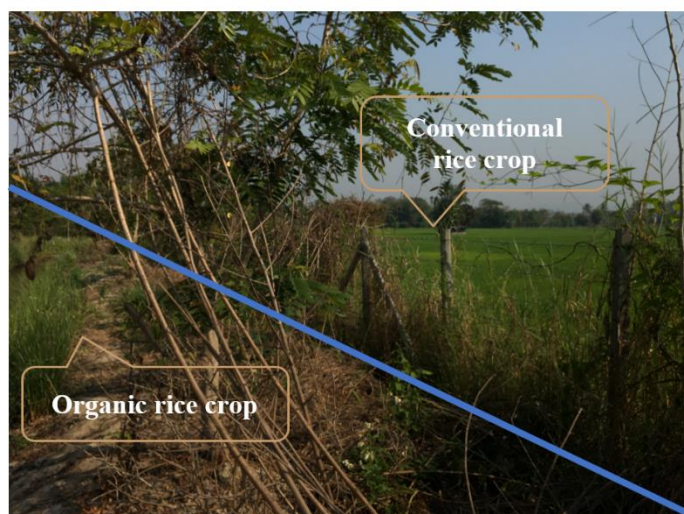
Q 14	How did you do soil sampling? And who helped you?
Q 15	How long does the soil testing take?
4. Prevention and control of diseases, pests, and weeds	
Q 16	What is your crop pest, diseases and weeds issues?
Q 17	How do you prevent your crop from pest, diseases and weeds?
Q 18	How often do you prevent your crop from pest, diseases and weeds? Who helped you?
Topic: Organic certification requirements	
5. Seed	
Q 19	How do you obtain organic seed? Who are your suppliers?
Q 20	How long does it take to receive organic seeds?
Q 22	What did you do to demonstrate the materials of your seed? Why is it hard to demonstrate? How was/were the problem(s) solved?
6. Harvest management	
Q 23	How do you harvest paddy? What type of containers are used for harvesting?
Q 24	What is your post-harvesting handling procedures and equipment?
Q 25	How long does it take to prevent paddy from contamination? Why did it take a long time? How was/were the problem(s) solved?
Topic: Organic certification processes	
Q 26	How long did it take to apply of organic certification? How did you apply? Why did it take a short/long time?
Q 27	How long did it take to prepare a document? Who helped you?
Q 28	How long did the inspection process take?
Q 29	How long did the condition review process take? Why did it take a short/long time? What was a condition that you need to review?

Appendix E: Evidence of site visits

Farm location: Chiang Mai, Thailand



Prevention of chemical contamination from neighbouring farms



Soil preparation and management of organic farms



Sun hemp



Diversity of plants



Beans



Soil preparation

Pest, weed and disease prevention techniques on organic farms



Organic rice harvesting and post-harvesting



Manual reaping



Threshing machines



Milling machine



Storage